Forestry

OCT 8 1935

VETERINARY MEDICINE

November 1935

Special Number

on

Small Animal Practice

Edited by John F. McKenna

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VOL. XXX
No. 11

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

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VOL. XXX NOVEMBER, 1935 No. 11

Published Monthly by the Veterinary Magazine Corporation
75 East Wacker Drive, Chicago, Ill., U. S. A.
$4.00 a Year; per Copy 50 Cents.

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Small Animal Practice, V

WITH this issue we present our fifth issue dealing exclusively with the problems of practice among animal pets and caged animals. Preceding special issues on these subjects dealt primarily with the fundamentals of small animal practice and their application to the simpler problems of such practice. They were designed principally for those in general practice or in the early years of specialized work in the field of small animal practice. They met with an astonishingly warm reception and undoubtedly each served a highly useful purpose, valuable to the profession as a whole.

THIS special issue is frankly for the expert; touching fundamentals but briefly, it deals principally with complexities and refinements of small animal practice. In a publication circulating among all classes of veterinarians and all branches of the profession to a greater extent and in larger numbers than any other veterinary magazine in the world, some explanation is due for devoting an entire issue to the interests of a relatively small group. A sufficient justification will be found in the articles that follow.

In addition, it should be emphasized that conditions surrounding veterinary practice are ever changing. To a very considerable number, the opportunity may come at any time to develop a large practice in this field, necessitating a numerous staff and extensive facilities. Notwithstanding one's high, professional attainments, success will be achieved only if there be also an efficient business organization. Doctor McKenna's article solves this angle of the problem. The rapid growth of the dog industry is bringing the problems of cynogenesis to an ever widening circle of veterinarians. Doctor Campbell's article affords the information upon which the general practitioner may, if he will, develop the same degree of skill in handling canine obstetrics that he has long employed in the dystocia of the mare and cow. The casualties of the World War much improved medical practice in the treatment of shock. The veterinary profession as a whole has not made a comparable advance in the treatment of this condition, although automobile injuries have made it a matter of greater or less importance to all veterinarians in every section penetrated by paved roads. The scholarly article by Doctor Cozzens affords a guide for progress in the treatment of animal victims of automobile accidents. The tremendous

(*Continued on page 479*)

The Author.

Causes and Treatment of Canine Dystocia

By J. A. CAMPBELL, Toronto, Ontario.

YOUATT, writing in London on the diseases of the dog some hundred years ago, mentions "Great numbers of bitches are lost every year in the act of parturition." There was dystocia then, in the days before dog shows, and before breeds were established. Since Youatt's time, however, difficult parturition has increased greatly. Of recent years, with the standardization of breeds and the rapid growth and influence of the dog breeding industry, dystocia has become of far more frequent occurrence.

Man has been very successful in the breeding of all kinds of livestock, but possibly his greatest achievement in this line has been the remarkable number of different types of dogs he has produced. New varieties are being constantly recognized by the kennel clubs, and there are now over one hundred distinct breeds. Indeed, the development of canine breeds would seem to imply that there is almost no limit to the odds or even freakish dog characters which man may produce as a breed by careful selection and definite aim.

It is hard to imagine that the massive Saint Bernard and the tiny Chihuahua originated from a common ancestry. There is no proof to the contrary, though authorities are at variance as to the original forebears of the dog; but it is generally agreed that the jackal and wolf, two of nature's wild dog species were to a great extent founders of the race from which has sprung our many and varied domestic dogs of today.

NATURE'S model of what a dog should be differs greatly from some of the radical breeds that man has established. Consider nature's ideal of a dog, the wolf, the coyote, jackal and fox. All are long, lean and lithe, with well proportioned conformation. Contrast with these man's conception of what a dog should be to meet his fancy or need, as evidenced by what he has developed, particularly in the achondroplastic type. Some of the man-made dogs have been developed in almost complete defiance of nature's model as the new creator indulged his whim for standards to meet real or fancied needs. Dystocia is a frequent and unwelcome by-product of this highly specialized selection.

Many of the present day dogs are actually a triumph of deformity. Predominant points of the English bulldog, the French bull and the Boston terrier, imposed by taste and the demand of prize standards, are dependent on a marked deformity of head and tail. The Scottish terrier, dachshund and basset hound exhibit a favored shortening of the legs which is, in effect, from the viewpoint of nature, a localized dwarfism, however much it may be fancied by lovers of those types. The Pekingese has deformity of both head and legs.

In countries where bench shows do not

exist, and dog breeding is governed by the law of the survival of the fittest, the prevailing type of dog is built on racy lines, resembling the wild canidae. Parturition difficulties no doubt play a large part in staying the development of chondrodystrophic types in these communities.

BEFORE showing how this unnatural conformation, interfering with the balances and demands of nature, has made great contributions to the cause of dystocia, it might be well to emphasize further that this achondroplasia, now established as standard in many breeds, was based in the first place on the appearance of strange or even grotesque mutations or sports. Distorted types appeared, no doubt due to a complex of the endrocine glands; that at least there is little doubt that oddly formed specimens, in dogs as in other animals and humans, were the result of an unbalanced performance of the internal secretions which control growth and development.

However, fanciers, through whim or because a useful type of dog was indicated, seized upon dogs showing a tendency to such variation and bred them selectively, to establish and perpetuate the freak. This gradually brought about a definite and hereditary achondroplasia in particular breeds such as the bulldog and the short legged varieties.

Indeed, it is not going too far to say that most of the radical departures from Nature's model, the very large, the abnormally small, those having unnatural freakishness of head, legs or tail or other distortion, are results of a breeding system, which has seized upon individuals with faulty glandular secretions and bred them to establish a fixed chondrodystrophy. Many of the most noted breeds of today are, therefore, the victims, if you will of man's ability to control and develop the first chance, inherent weakness of individuals.

HOWEVER, we are concerned here with the contribution of this established achondroplasia to a great increase in the prevalence of dystocia. It is unquestioned that these abnormal standards have made it most difficult in many cases for parturition to proceed naturally in these dogs. The balance of feature and form has been destroyed. Particularly do the toy breeds, or midgets of the dog family, owing to their small physique and the dominant hereditary tendency of their young to revert to normal size, provide many cases of difficult birth. As for the giant, or overgrown representatives of the canine race, their difficulty lies in a tendency to lack the tone or vitality possessed by normal breeds. They do not have the energy and force so necessary to expel large litters, in the protracted ordeal of labor.

It is a noteworthy fact also, that uterine inertia is allied with endocrine deficiency and is a not uncommon cause of dystocia. This is far more prevalent among the radical types than among the better balanced breeds. There is a definite hook-up between the lack of the hormone secreted by the glands influencing labor and unnatural skeletal structure.

COMMENCING with the beginning of this century, the breeds that are prone to difficult parturition have become very popular with the dog-owning public. Take the Boston terrier for example, thirty-five years ago a *"rara canis"*, today among the leaders in stud book registrations, and a general favorite in thousands of homes, as it has proved to be an ideal housedog in every respect.

This popular American dog, whose basic progenitor was the English bulldog, is a breed notorious for its short face, massive skull, thick muscular neck, wide chest and heavy shoulders, and a conformation which as far as natural breeding is concerned, shows a total lack of balance. Reversion to ancestral type is a very dominant characteristic in the Boston terrier owing to its recent origin, for it shows at birth a marked resemblance to its bulldog forebears, in that the puppies are too heavily built in the forepart for the capacity of their dam's genital passage.

Among the aforementioned breeds, there is a distinct tendency towards defective hindquarters. We find shallow ossa innominata, straight loosely formed hind legs, dislocations of the patella joint, all of which seems to be Nature's attempts to prevent artificial standards, since they constitute decided handicaps, to the delivery of puppies.

The hindquarters as a whole are very important structures of the machinery of labor, containing and supporting a great part of the genital system. Any imperfection of the structural conformation, or lack of proper angulation, decreases the leverage, which is essential in the act of parturition, since during the throes of labor, the entire fabric of the hind legs, down to the toes, is brought into action. Besides, any defective conformation of the "rear end" involves the pelvic girdle, lessening the necessary expansion of the pelvic funnel for the easy exit of the fetus.

THE enthusiasm of the fanciers of the breeds that are required to have abbreviated tails, such as the English bulldog and his two next of kin, the French bulldog and the Boston terrier, is going too far. The deformity and irregularity of bone placement existing in these "tight screw-tails" is not confined to the coccygeal vertebrae. It is quite evident that dwarfism is invading the sacral vertebrae and connecting tissues as well, and is becoming a more common hazard in the delivery of puppies.

The dog fancier, in his breeding operations, has concentrated on the forepart of the dog and definitely neglected the hindquarters, thus producing genital features which make a normal birth impossible for bitches in which pelvic canal has not undergone changes commensurate with those of the anterior part of the body. We habitually see well-bred females that have a good head and front, but are crippled behind, used as brood bitches; it is almost impossible for dams with such weakness to escape dystocia.

The system of judging the breeds prone to whelping troubles, is intensifying and perpetuating another factor of dystocia—shortness of the back. The same standards are applied to the bitch as to the dog, when there should be a decided difference. A closely coupled female of the masculine type cannot be a good breeding proposition, as she lacks the accommodation and is too heavily muscled in the hindquarters, thus restricting the necessary yielding of the genital structures to facilitate the passing of a fetus.

THE physical condition of the bitch has a great bearing on her ability to stand the ordeal of whelping. Many are too fat, or in poor muscular tone; the family pet, the lazy bitch, the female that conceives for the first time at three or four years of age and the regular breeder that is slowing up with age all show a tendency to accumulate even more fat during pregnancy. No matter what the breed, a decided lack of vitality and activity is manifested where the bitch is too fat and after a few attempts at straining, she usually gives up. The same applies to the other extreme. A thin or poorly nourished bitch, through debility and weakness, has a very hard time and tires rapidly. Regular and ample exercise is of the greatest importance in preparing for parturition; it is the "secret" of the successful breeder.

CONDITIONS that may obstruct the passage of the fetus, and that may be found in any breed are: deformities of the pelvis due to fracture or rickets, persistent hymen, a dry or swollen condition of the genital mucosa, or growths arising from the soft tissues in the genital passage.

Excessive expulsive effort, the condition opposite to inertia uteri, may give rise to dystocia, and sometimes is seen in nervous, excitable females that are in a state of hypertonicity during parturition.

Immaturity is another cause of difficult birth in females that become pregnant while yet undeveloped, and at parturition the genital canal is not of sufficient size for the passage of a normal fetus. This is quite often seen amongst Boston terriers, English bulldogs and Pekingese, breeders

of which are strong in the belief that it is advisable to mate females during their first estrum, with the idea that the pelvic structures are more flexible and yielding while the bitch is young; "it opens them up as it were."

There may be some foundation for this belief, but the first estral period varies so, in individuals, that some bitches come in season when only seven or eight months old, and if such females are mated, they are apt to have difficulty, as the termination of pregnancy will arrive before they have attained their full growth and development.

Fecal impaction and a distended bladder must not be overlooked as contributors to dystocia, as they will obstruct the passage of a fetus.

From a fetal standpoint, conformation is also a decided factor at birth. There is a distinct contrast between a puppy with a sharp pointed nose, long narrow skull, slim neck, slender body and thin supple legs, and one of the round-headed variety with its high forehead, heavily muscled shoulders, cobby body and thick unyielding legs. It will be seen, readily, that obstacles possessed by the latter, are a decided handicap in entering and traversing the pelvic canal.

A variation in the sizes of the fetuses occurs in the newer breeds, such as the Boston terrier, and one large puppy among others half its size, is often found. Where a mesalliance has occurred, the mating of a small bitch with a larger dog may result in the puppies being too big for the mother's capacity for delivery.

A large number of fetuses will give rise to over-crowding. A puppy located near the end of the horn may be lying just in front of the pelvic opening, and interfere with one about to be delivered, or two puppies may arrive in the fundus of the uterus at the same time, and prevent each other's exit.

When there are only one or two fetuses, which is not a normal pregnancy in the dog family, the bitch is very likely to run over her time, and owing to a lack of sufficient stimuli, there may be little or no labor effort. It is natural to assume, that where only a single fetus is present, it will be larger than if there were four or five, and that difficult parturition will follow.

Excessive amounts of fetal fluids, or lack of them, retained placenta, abnormalities such as hydrocephalus or anasarca and

the presence of infection—puppies rigid with rigor mortis, or bloated with emphysema, all restrict the process of parturition to such an extent that dystocia will occur, and there may be a hysterocele containing a fetus or two.

In dystocia in an easy whelping breed, mal-presentation is generally the cause.

BEFORE taking up the methods of dealing with dystocia, a word or two regarding normal parturition is in order.

Invariably, the indications of approaching parturition are, seeking some place to be alone, tearing up bedding to make a nest, lack of usual interest in the food, panting, change of facial expression, more or less discomfiture, vulva enlarged, mucous membrane red, giving off a (white of egg-like) discharge, and the presence of white milk. This state may exist as long as twenty-four hours before whelping.

As a rule young bitches, and older bitches undergoing their first whelping experience, show some excitement and cry out with pain; whilst those which have had several litters may not exhibit much evidence, or utter a sound before a puppy is born. Those that are affected by uterine

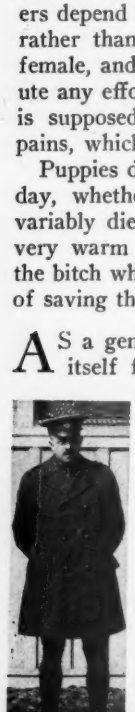
inertia will show little or no parturition activities. The usual position occupied by a bitch when whelping is lying on her side.

Some bitches will give birth quickly at regular intervals of from a few minutes to an hour; others may take all day with irregular delay between the births, whilst some of the large breeds may be two days in delivering a big litter.

The generally accepted idea is that the dog's period of pregnancy is sixty-three days. Some bitches will go sixty-five to sixty-seven and as long as seventy-two days, but experience and examination of the Stud book records show that more births occur at sixty-two days. Some owners depend too much upon the "time limit" rather than on the manifestations of the female, and novices are very apt to attribute any efforts the bitch makes, before she is supposed to be due, to "false" labor pains, which seldom occurs in the dog.

Puppies delivered before the fifty-eighth day, whether naturally or otherwise, invariably die, unless kept by themselves in very warm surroundings, and held on to the bitch whilst nursing. There is a chance of saving them by these measures.

AS a general rule a puppy will extract itself from the fetal envelope by its own efforts, or the bitch will release it by tearing the membranes open with her teeth. Occasionally a bitch may be so exhausted or the puppy so weakened from a protracted delivery, that a fetus may be left to die in its placental covering, unless freed by the caretaker.



Col. J. A. Campbell

The objection which some owners have to permitting a bitch to eat the afterbirths is a mistaken idea. In reality, they are nature's ready food for her when occupied so closely with her new duties. Further the placentae contain a hormone that stimulates the milk supply and the other exigencies associated with birth.

We occasionally have cases of "false conception" brought in for dystocia treatment; these not only show evidence of being in whelp, manifesting signs of parturition, but some even nurse puppies readily.

When gestation has terminated a bitch will show a characteristic expression of contentment and will become fully occupied with cleaning and nursing her young, but if there is evidence of the slightest straining or if she continually leaves the nest and assumes the position of urinating, or if there is a continuance of a blackish-green discharge, this indicates that either a puppy or an after-birth remains. Generally speaking this condition is obvious, as the bitch grows uninterested in her young. her appetite fails, and, as time goes on, toxemia appears. Some bitches may retain a puppy or two, carry them for several days and seem normal, then without ill effects finally deliver them.

With dogs larger than the Boston, it is often difficult to determine by palpation whether the uterus is empty. In such cases a guarded opinion should be given, and the bitch examined under the fluoroscope or, better still, an x-ray photograph should be taken.

ALL parturition cases require a careful and thorough examination, in order that a correct diagnosis of the female's condition may be ascertained. It is necessary to know when the bitch is due, the number of services, if she has had pups before and whether any difficulty was previously experienced; also, in the latter case, if the same sire was used. Ascertain when the first signs of whelping were noticed, the extent of her efforts, when last fed, and whether any vomiting has occurred. And what is of great importance; one should ascertain whether any previous efforts had been made to treat the case, if so a guarded prognosis should be registered.

The region of the vulva should be washed, disinfected, and if need be the hair removed. A vaginal exploration is then made to ascertain conditions in the

genital passage; namely existence of obstructions that might interfere with delivery, particularly as to deformity of the pelvic funnel, and whether dilation of the uterus has taken place, the presentation and state of the fetus.

UPON completion of the examination, if it is found that the uterus has dilated, and a fetus is present at the pelvic opening, it is necessary to make up one's mind quickly, as to whether the case calls for immediate action or permits of delay. At the same time, whilst one should not be too hasty in giving a final decision, there is danger in delay and it is not advisable to leave too much to Nature, who has long since given up her interest in the domestic dog.

There is always the possibility of the female being able to deliver the pups, and bitches have been known to have whelped naturally, in spite of impossible indications; but the risk in waiting may not warrant any postponement of active assistance. Here, it is well to consider how long a fetus will live after the membranes have ruptured. I have known them to be very much alive twelve hours after, but only in cases where there was no straining.

As a rule bulldog and Boston terrier fanciers do not wait very long before seeking assistance, in fact they are inclined to be overly anxious, but a fox terrier or collie breeder, to whom dystocia is rare, may not seek advice for a day or so after it has set in.

We must bear in mind that a live, uninjured puppy is a very pleasing sight to an owner; besides the prospect of it some day becoming a champion, it is an indication that skill and care were used to effect delivery. On seeing the helpless, delicate little animal safely born, the owner receives the impression that there could not have been any harm done to the bitch; whereas, with the exhibit of a dead and mutilated fetus, the opposite idea may be created, and if any ill results to the bitch, someone is apt to say that "the case was not handled as gently as it might have been." It is advisable, therefore, to consider well the different methods of treatment before rendering assistance.

They depend of course upon circumstances, and may include watchful waiting for a time, manipulations, ecbolics, the use of instruments, or Cesarean section. A combination of these methods, excepting hysterotomy, will sometimes meet with success. The extraction, or straightening out of a mal-presentation with forceps, with perhaps a dose or two of pituitary extract, and a little assistance by manipulations may be all that is required to bring about the natural delivery of the remaining fetuses.

In cases of belated parturition, the termination of pregnancy can be brought about by using pressure with the forefinger against the opening into the uterus. If the results are negative after six hours or so another attempt should be made. A brisk laxative or an enema will help, often, to start things.

VERY frequently puppies can be delivered with the hand, by introducing a finger into the genital passage, and the act of moving it around will be the means of stimulating the labor pains. If the fetus can be felt and made to move, straining on the part of the bitch is likely to increase. This in itself is frequently sufficient to begin labor, in fact, a drive around the block in an auto, or even having the bitch run up and down stairs will sometimes start the delayed birth.

By palpating and massaging the abdominal walls it is possible to propel a fetus along the uterine passage and eventually expel it. Cases occur frequently, particularly in immature bitches, where a puppy is held up and becomes stationary with its head or hind legs protruding from the vulva. Delivery is made by the fingers, by gently pulling the protruding parts and gradually working higher and higher, at the same time assisting through the belly walls with the free hands. Where only one hind leg is felt, the other should be secured, so as to distribute the strain. It is of great

help to have several pieces of soft cloth at hand while delivering puppies. When it becomes necessary to grasp a fetus with the hand it should be covered with gauze, to obtain a firmer hold.

A towel placed around the body of the dam, just posterior to the ribs, and twisted until tight, is of great assistance in aiding the expulsive efforts.

Dislocation of the first cervical joint is the commonest cause of killing puppies during delivery. This can be guarded against by securing a hold with the finger and thumb on the neck, posterior to this articulation before any efforts to move it by pulling are commenced. A similar dislocation can occur with a breech presentation when the back of the head becomes fixed against the edge of the pelvic roof and traction is continued. When this happens the chin should be tilted upwards, and the head forced through with an inward and backward pressure of the first two fingers of each hand on either side of the belly wall.

ECBOLICS, chiefly pituitry extract and prepartions of ergot of rye have their place in dystocia. Ergot of rye gives indifferent results. Of the two, the pituitary extract is the more reliable. It acts quickly and effectively in some cases. The use of ecbolics is indicated where the phenomenon of parturition has commenced and the passage is clear for birth, such as in uterine inertia, or in protracted cases where the expulsive effort has become exhausted. If the desired effect is not obtained by the use of two doses of pituitary extract a repetition does not appear to improve matters, and time will not permit of further dependence upon it. Different treatment of a positive nature must be taken immediately if unfortunate results are to be avoided.

WHEN should we use instruments? This will of course depend on the practitioner's ability, time and patience, and whether he has long slender fingers, and a good assortment of sizes and shapes of forceps. If he hasn't these, he had better by far resort to hysterotomy as soon as possible in cases where there would be any danger to the bitch or to the pups with the instruments he has. Generally speaking, instruments are indicated where dystocia occurs after the birth of several puppies, when it is known that dead puppies are present, and where it is more advantageous to save the bitch, than the progeny.

Before delivery is attempted with instruments, the hair should be clipped in the area surrounding the region of the vulva and tail, and the hindquarters and belly thoroughly washed and disinfected. It is also advisable, wherever possible, to cover the parts with a sterile cloth. The sterilized instruments should be placed in a mild antiseptic solution, and two dishes of the same solution should be prepared in which to rinse the hands.

The bitch should be made to stand, except when an anesthetic is being used for this method of delivery, as any other position will have a tendency to crowd the abdominal viscera onto the contents of the uterus.

I have tried all kinds of hooks, snares and forceps, but practically the only instruments I now use for delivery are forceps; my favorites being the differently shaped human placenta forceps.

For the removal of live puppies, I find the Corey forceps most satisfactory. They are long enough for the big breeds, can be used safely for the large 'toys". For very small bitches I have a pair of reduced size. They have the advantage of being strong, though lightly constructed, with smooth, thin, flexible blades which give a good distribution of pressure. Each of the two sections being detachable, they may be placed on the fetus separately, and joined together or taken apart whilst inside the uterus.

Most of the bitch forceps are heavily made, particularly those with the inside surface of the jaws serrated. These are serviceable in extracting a dead puppy, and for this purpose I favor Aston's pile

clamps, especially when it is found necessary to crush a skull, or to remove a fetus piecemeal. Care has to be taken in their use, as the surfaces of the jaws are sharp at the edges.

The desideratum in working with instruments is to acquire the "feel" of things inside with them, to know by their touch, whether they are on a part of the uterus or fetus. Ordinarily it is not advisable to attempt their use, unless the puppy can be felt with the finger but where a fetus is beyond the reach of the finger, and there is plenty of room, they may be tried. The possibility, of inflicting injury to the bitch must be uppermost in the mind of the operator. Before exerting pressure with the instruments, precautions should be taken to ascertain that no part of the genital wall is included in their grasp.

When the head arrives at the brim of the pubes, the end of the finger should be placed under the chin to close the mouth. If this is not done, the lower jaw will become jammed against the edge of the pelvis, since the pressure of the forceps causes the puppy to open its mouth. In the event of the head becoming lodged at the entrance of the pelvic funnel, a finger exploration through the bowel will give some idea as to whether the skull will safely pass along.

It is advisable to try several forceps of different shapes, and sometimes a change of operators will meet with immediate success, as the sense of touch is lost if the hands tire.

While instruments are on the head, there is a great possibility of the ear being torn off, or an eye injured, the latter especially in the breeds with prominent eyes.

With a breech presentation, the forceps should be placed on the fleshy part of the leg if possible, before any pressure or traction is made, as it is better able to stand injury than the other structures. It is always advisable to apply traction in conjunction with the efforts of the female, and plenty of time should be taken. A good assistant can help by manipulating the fetus through the abdominal walls and working it along the passage. By seizing the skin with artery forceps on either side of the neck, or as far up the back as possible in a breech presentation, a better distribution of the strain is made, and it is a very effective way of extracting a live puppy.

When it is known that a puppy is dead, every effort should be made to crush it as much as possible before attempting to withdraw it. With such cases there is danger of infection, and we always thoroughly irrigate the uterus by using therapogen, permanganate of potash, or saline solutions, which should be continued if infection is manifested.

Where a condition of dryness exists, of both the fetus and the maternal mucosa, which are usually swollen as well, we inject some mild antiseptic lubricant, and for the latter purpose a grease gun, which was originally intended for packing gauze into a cavity is used. Flaxseed tea, which closely resembles the fetal fluids, is also very efficacious.

The use of general anesthesia in conjunction with forceps, often works well. We have seen bitches expel a fetus while ether was being administered for a Cesarean operation, prior to which there had been no results from continued straining on the part of the bitch.

WHEN delivering puppies, care should be taken always to remove the placenta at the same time. Forceful and abrupt traction at this point, is apt to sever the umbilical cord, and if the placenta remains in the uterus, it is liable to impede the passage of a fetus. They should always be counted.

In the event of a retained afterbirth, it can be removed with a placenta burr, which, on being passed well into the uterus, is gently turned round to gather up the loose shreds of the membrane until by the feel it is known that the whole mass is wound around the instrument.

We should always consider the suffering and exhaustion of the bitch. If the operation is of long duration she should have

frequent and ample rests. Quite often, during these intervals, the fetus will change its position and move into a more favorable site for delivery.

One cannot but be impressed by the manner in which bitches submit to handling and particularly to the use of instruments. Some young nervous females are apt, at first, to resent assistance, but in a short while, all resentment ceases, and they behave as if they realized that help is being given. Only occasionally does one encounter a bitch that persists in resisting in such a violent manner, that the use of instruments is highly fraught with danger to her. For such uncontrollable individuals the only treatment is hysterotomy. The same applies when a rupture of the genital wall is found or takes place while forceps or other appliances are being used.

A DECISION to discontinue the use of instruments should be reached at the earliest possible moment, as their persistent employment without accomplishment increases the hazards of delivery. One need not delay in this, for there remains, fortunately, the Cesarean operation, which is now recognized as a practical and humane method of effecting delivery in cases which otherwise result in disaster to mother and offspring. The good results attending this operation have established it as a regular procedure with dogs prone to whelping difficulties.

When I first became interested in small animal practice, difficult parturition was not so prevalent as it is now. The matrons were generally of sentimental rather than breeding value and the main object was to save the bitch. Veterinarians regarded the use of instruments as all that was required for the treatment of dystocia, and while it was possible among certain breeds to deliver many live fetuses with instruments, their use with the Boston invariably meant death to the young and serious risk to the dam.

The advent of the Boston terrier made hysterotomy an essential treatment of dystocia. Fanciers of this popular new breed had to have more than dead puppies for their breeding plans and financial outlay. The continual delivery of mutilated fetuses was most discouraging to the owner and veterinarian. To meet the situation we had to resort to laparotomy as a means of effecting safe arrival of puppies.

For a time I operated through an opening in the median line, until I had the privilege of seeing Connie Sullivan of Boston perform. He invaded the abdominal cavity through the flank and paid particular attention to closing the aperture in the uterus with two rows of catgut sutures. He used ether as the anesthetic.

A WORD about the late Connie Sullivan, who was by the way a bit of a genius. He was one of the original fanciers of the Boston terrier. Not only did he breed good specimens but he was called upon to judge all over the continent. He also interested himself in cropping dogs and performing other minor surgical operations, and gained a very considerable practical skill.

The incidence of dystocia was becoming evident with the breeding of Bostons and Sullivan realized that something more than the use of instruments was necessary to relieve it and meet its dangers. At that time a number of medical men were interested in the raising of Bostons. By diligent study Connie learned from them the practical surgical technique, and with their help started in to perform Cesarean operations. Few veterinarians were performing at that time, and Connie Sullivan must be credited in veterinary surgical history as a pioneer, though a layman. He was, it might be said, a natural born surgeon with sensitive and nimble fingers. In time he developed great skill in handling routine cases. As a special privilege he let me, as a young veterinarian, see him perform. I adopted Sullivan's methods, including the use of ether as an anesthetic. I now, however, use local anesthesia for over 90 per cent of my cases, and close up the outer layer of the uterus with one row of continuous sutures.

THE following instruments should be available for Cesarean section: One surgical knife with a convex cutting surface, one blunt pointed bistoury, one pair of blunt pointed scissors, two artery forceps, two human tongue forceps, one for holding the uterus the other for securing a puppy's leg if necessary, needles and suturing material, 00 or 0 catgut for the uterus, Nos. 0, 1 or 2 chromic catgut for muscle walls, and waxed linen thread for the skin.

THE abdominal cavity is invaded through the left flank. On the second occasion the incision is made in the right side, and on the third in the left flank again. This location has many advantages over the median line. The wound has a better chance of uniting, and frequently heals without interruption. If drainage is required, its position is such that it is easier to care for, and may be cleaned while the bitch is lying down. There is very little likelihood of hernia, and the part is more out of reach of the puppies. Objection has been raised that a scar in this location is seen more readily. This is not so, as in most cases one has to look closely to see whether a bitch has been operated on.

In the case of the median line incision, the mammae are very much in the way, and owing to their active and sensitive state at the time, inflammatory processes may extend into them, moreover, the position of the wound makes cleaning difficult. There is greater weight to carry, as the abdominal viscera are more likely to come into contact with the region, and hernia readily occurs. The puppies, also, are apt to irritate the opening and annoy the mother.

AN area of four inches by six for a Boston terrier is shaved and disinfected with tincture of iodine. As a general rule, in making the skin incision, the last but one teat is taken as a guide. The incision should end about an inch or so above the border of the mammae and be made vertically, varying in length from three to four inches. No particular advantage is to be gained by operating through a small opening, and there is always danger of tearing something. Should a quantity of fat be found beneath the skin, it is removed, and the muscular tissue elevated with a hook. The incision is continued through the three layers, until the abdominal cavity is entered with an aperture about an inch long. While the muscles are still elevated, the opening is enlarged with a pair of blunt pointed scissors. At this point a small artery may be severed, and slight hemorrhage encountered, which is controlled with the forceps.

SEARCH is now made for the end of the uppermost horn and its ovarian attachment, which is followed down until a fetus is located. It will depend on the number present, as to how much of the uterus will be exposed. If there are many puppies, it will be advisable to go as near the bifurcation as possible, so that both horns may be evacuated with the least effort. If difficulty arises in evacuating the lower horn, make another opening.

The use of dry gauze allows a firm grip to be taken of the slippery uterus. If it is overdistended with fetal fluids, a small incision through the uterine wall will allow the fluids to escape and relieve the tension.

TO open the womb, a site is selected that is not very vascular or directly over the placenta, an incision is made in line with the long axis of the organ. It should be of ample size, for if the aperture is too small a right angle tear is apt to result while withdrawing a fetus. Tongue forceps are applied lightly to the uterus just above the orifice, so that an assistant can hold it in such a position that the fetal fluids will drop clear of the body, and not into the abdominal cavity.

The pup and placenta are extracted by a steady, gentle pull and dropped in the hands of a waiting assistant, or into some heated receptacle. When it is the latter, the pup is freed from any coverings, and the mucus is dislodged from the nose and mouth, by shaking the head. Afterbirths may be detached at once or later. When

there is a delay, or a large number of puppies are to be taken out, necessitating lengthy exposure of the parts, coverings of hot sterile cloths should be used. They aid materially in contracting the uterus and checking hemorrhage. Occasionally bleeding will continue for a day or so and cause death.

Sometimes all the puppies are contained in the lower horn, in which case the incision is made through the lowest part of the nongravid horn. A puppy may be so situated that difficulty is experienced in bringing it to the operation opening, or owing to its slimy condition, a firm hold cannot be secured with the fingers. Aid may be given by an assistant passing the flat of his hand under the belly wall, to press up the contents toward the opening. At this point the human tongue forceps is a very useful instrument for grasping a leg, and it is here that the cheese-cloth is handy as well.

The womb may exhibit quite a variety of conditions with respect to the contents, such as live puppies among dead ones, in different stages of development and decomposition. Parts of the uterus may be necrosed, particularly where it is in contact with a dead fetus, partial or complete excision of the uterus will be necessary where any necrosed areas are found. Prognosis is very unfavorable, yet it is astonishing how bitches will survive, when showing signs of being toxic, and unsatisfactory conditions prevail. We never attempt to flush or irrigate with disinfectants; any cleansing that is done, is confined to mopping with dry, sterile swabs.

WHEN all the puppies with their placentae are removed, the uterus is closed by means of a single row continuous suture, including only the outer layer; fine catgut of the required size being used. With the removal of blood clots or any debris, the uterus is returned to its position in the abdominal cavity.

Peritoneum and muscles are sutured together with chromic catgut by the interrupted method, the stitches being one-quarter to one-half an inch apart. The skin is united by wax linen thread with interrupted sutures one-half inch apart.

I AM a firm believer in having the bitch in her home within a few hours after the operation. She settles down much better than if left in a hospital amid strange surroundings. The following day, the bottom stitch is removed for drainage. Instructions are given to see that this is kept

open and cleaned several times a day, and to report immediately any change in the disposition of the bitch. If unfavorable symptoms are noticed, such as loss of appetite, the temperature 103° F., or no interest shown in the young, we advise taking the puppies off the bitch and placing them on a foster mother or artificial feeding.

A QUESTION often asked regarding hysterotomies is whether it will always be necessary to operate, once a bitch has had a cesarean. The answer is not always, although the majority will have to undergo similar treatment, quite a few will whelp subsequently without aid.

Another question is how many Cesarean operations is it possible to perform on a bitch? The most I have known is eight. This female was a wonderful brood bitch and she never failed to produce a winning pup at each pregnancy. As a rule, however, breeders give up mating bitches that require to be operated upon after the third or fourth time, unless the dam is an exceptionally good one.

Dr. J. F. McKenna at his desk in the Ambassador Dog & Cat Hospital.

Hospitalization and Accounting System for a Small Animal Hospital

By JOHN F. McKENNA,
Ambassador Dog & Cat Hospital,
Los Angeles, California.

THE successful small animal hospital, in addition to furnishing able professional service, must possess sound business management. In order to establish and maintain a business entity, the institution should be organized on an efficient basis that will produce, over a period of years, sufficient return for services rendered and capital invested.

The guide for sound business management comes from facts developed by an adequate and actual system which will express the results in figures of the various activities and departments of the hospital. The actual system should be installed by a trained accountant who has first made himself intimately conversant with the operation of an animal hospital. The manager of the hospital should give this accountant his hearty cooperation; making available to him the knowledge he has acquired as director of the hospital.

THE start of any accounting system consists of a chart of accounts which will set out the assets and liabilities, net worth, income, and expense accounts, in a logical sequence and provide the basis for an integrated picture of financial position of the enterprise, and the factors developing as a result of operation, or what is commonly known as net profit or loss.

After the chart of accounts has been established, the books of original entry may be designed from the standpoint of minimum bookkeeping efficiency. Entries in the book of original entry should be substantiated by journal vouchers, invoices, cash tags, record cards, etc.

THE importance of a systematic auditing of the records is not to be overlooked. An adequate system of internal check is necessary to insure the integrity of the accounts. An audit by an independent public accountant at least once a year will prove to be a beneficial check on all employes, and will give the director of the hospital the benefit of an impartial opinion on the status of the accounts, and probably many helpful hints as to more successful methods.

The matter of credit extension should be given careful attention, and a collection policy established to keep losses at a minimum.

In the operation of a small animal hospital the chances of not recording and entering into the proper records, services, medicines, and other supplies incidental to the treatment of cases is very likely to occur, unless a systematic system of recording the entry into the hospital and the work or services performed on the animal after it has entered is recorded in a simple and orderly manner.

THE following outline of a recording system has proved efficient in our institution:

When an animal enters our hospital, or we receive a call to pick up an animal, or receive an order of any kind pertaining to the handling of a case, we use the following duplicate entry tag, as the basal operation,

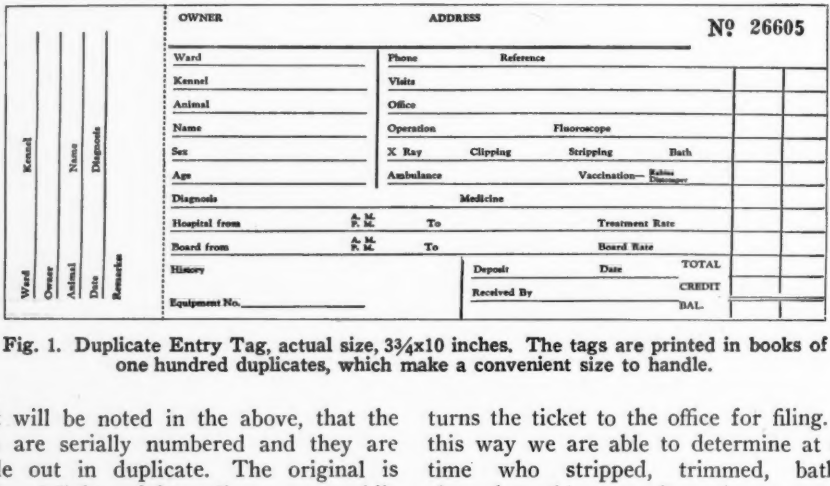


Fig. 1. Duplicate Entry Tag, actual size, 3¾x10 inches. The tags are printed in books of one hundred duplicates, which make a convenient size to handle.

It will be noted in the above, that the tags are serially numbered and they are made out in duplicate. The original is made of light-weight, yellow paper, while the duplicate is made of white light-weight, cardboard. After the tag is made out, the first, or lighter sheet, goes into the receiving basket, the heavier cardboard goes into a file alphabetically arranged. This file contains all cards representing the cases, both medical and boarders, that are in the hospital. It also contains cards for the "out" cases and the ones that are returned for office treatment are designated by marking on the cards, the symbol "T to T", indicating time to time. The stub from the white card, which simply has the owner's name, kind of animal, ward and kennel, goes back with the animal, and is attached on his kennel. The equipment is checked and the number of the check is placed on the card.

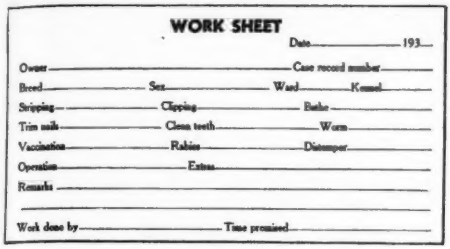
On the entry card a space is provided for deposits which are required at the time the animal enters the hospital, unless the owner has a regular account.

AT the same time that the duplicate entry tag is made up, in the event there is any work such as stripping, clipping, teeth to be cleaned, vaccinations of various kinds, a work ticket is made on the form shown in Fig. 3.

The work tickets (Fig. 2) are filled in and sent to various parts of the hospital. Whoever performs the work signs and returns the ticket to the office for filing. In this way we are able to determine at any time who stripped, trimmed, bathed, cleaned teeth, or performed any professional service.

THE first thing in the morning a hospital chart is made up from the cards representing cases in the hospital, which are in the alphabetical file.

The date of entry, owners name, record number, breed, name of the animal, ward,


WORK SHEET

Date 193

Owner Case record number

Breed Sex Ward Kennel

Stripping Clipping Bathe

Trim nails Clean teeth Worm

Vaccination Rabies Distemper

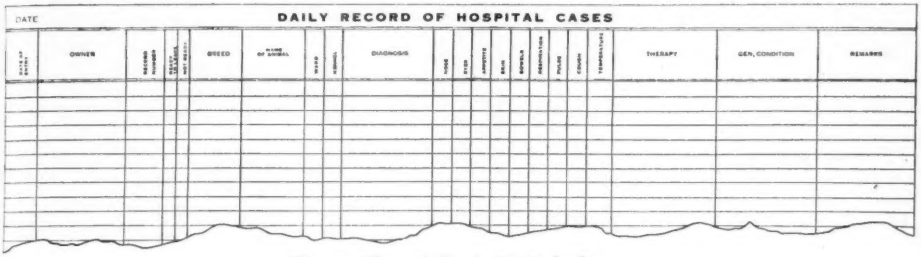
Operation Extras

Remarks

Work done by Time promised

Fig. 2. Work Sheet, actual size, 3x6 inches.

kennel, and diagnosis is made out on the typewriter. The sheets then go back to the hospital, and the members of the staff as they treat the patients, designate in pencil


DATE

DAILY RECORD OF HOSPITAL CASES

OWNER | BREED | DIAGNOSIS | THERAPY | GEN. CONDITION | REMARKS

Fig. 3. Size of sheet, 18x12 inches.

by a symbol code on the chart following the diagnosis, the general condition, therapy, and remarks. (See Fig. No. 3.)

Any code can be made up, but we use one about as follows:

For the condition of the nose—D—discharge; C—clear.

For the eyes—C—clear; D—discharge; GL—glassy; U—ulcer.

For the appetite—F—fair; G—good; 0—none; P—poor.

For the skin—N—normal; DA—dandruff; Ecz—eczema; IP—improved; M—mange; OW—ring worm.

For the bowels—B—bad; C—constipated; D—diarrhea; DB—diarrhea with blood; L—loose; N—normal; 0—no feces.

Respiration—N—normal; IR—irregular; R—rapid; SH—shallow; S—slow; W—weak.

Pulse—N—normal; F—fair; G—good; IR—irregular; IT—intermittent; P—poor; R—rapid; S—slow; W—weak.

Cough—0—none; DE—deep; Sh—shallow; S—slight; B—bad.

Temperatures are then taken and indicated on the chart, followed by a notation on the general condition with the following symbols:

B—bad; BS—bad shape; CR W—craving water; DF—doing fine; DW—doing well; F—fair; G—good; IP—improved; P—poor; SL—slight improvement; T—thin; W—weak.

Under therapy, prescription numbers of standard hospital preparations are used.

Under diagnosis we use a few symbols such as: K—distemper; GE—gastro enteritis; FF—fright fits; OW—ring worm.

IN the event special treatment or service of any kind is performed on a case in the hospital, and as members of the staff apply this service, they make a memorandum and deposit it with the bookkeeper who in turn posts it on the hospital card in order that all service charges appear at the time of settlement of the account.

IF they so desire, to clients living out of the city, or that are out of town for any reason, we send a post card at frequent intervals giving them a recapitulation of the daily hospital chart.

Note that the form on the post card is the same as on the hospital chart. Symbols are not used on post cards. (Fig. 4.)

EACH morning as the tags are taken out of the desk basket, all yellow tickets are recorded in the register book. This register book simply has the number of the ticket plus the owner's name. These tickets are then filed away numerically.

The same desk basket each morning also contains the white cards which represents all completed cases from the day before, whether paid or charged. These white cards are first checked against the register book, which indicates that the case has

Ambassador Dog and Cat Hospitals, Inc., Ltd.

3684 Beverly Blvd.
2 blocks east of Vermont Ave. Los Angeles, California Telephone Fitzroy 1255

DAILY REPORT ON	BREED	NAME	
Nose	Eyes	Appetite	Skin
Bowels	Respiration	Pulse	Cough	Temperature

*This report made at*_____M.

Ambassador Dog and Cat Hospitals
DR. JOHN F. McKENNA, President

NOTE: This report is a recapitulation of the daily hospital chart of your pet.

Fig. 4. Post Card report to absent owners.

been completed and left the hospital. The result of this checking should show the unchecked names in the register are cases in the hospital or incompleted; in other words, the cards have not shown up and, therefore, must be in the alphabetical file.

The hospital alphabetical file is checked frequently against this register book in order that no white card can be destroyed; that is, the white card has either been checked out or must be in the alphabetical file. After the white cards have been checked against the register book, they are then checked against the daily sheet. An individual sheet is used each day. The sheet simply has the date filled in, the owner's name, hospital employe who received the money signs the column indicated, and the amount of the sale. A sample daily sheet is shown in Fig. 5.

It will be noted that ledger accounts received during the day are also posted on this sheet, whether they are paid in the office or received through the mail.

The total amount of the cash sales are posted under cash sales in the cash book, and the ledger accounts received are posted to the individual names; then charge accounts are posted to ledger cards.

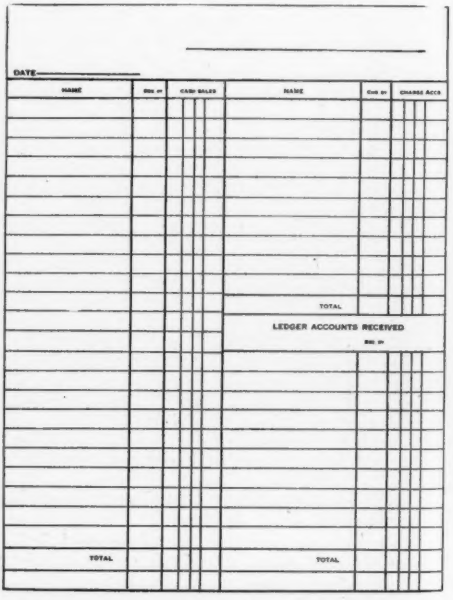


Fig. 5. Daily Sheet, size 8½x11 inches.

A COMPLETE record book of the transaction is kept, and the segregation is made from the white card. In this segregated record book we keep a complete accounting of the various departments; that is, hospitalization is credited under hospital; outside visits are credited to outside calls; x-ray work is credited to x-ray; sale of drugs is credited to drugs and supplies. These are posted into a general ledger at the end of each month. It is very easy for us to determine each department's income, and how they compare both monthly and yearly.

On all hospital cases weekly bills are sent in the event the case is in the hospital for that length of time.

In addition to the foregoing rough skeleton of our accounting system, we have a complete system of bookkeeping, which, of course, can be adapted for the individual hospital as its needs require.

IN an analysis of the above system, it is readily seen that each case is recorded when it comes into the hospital, and it is impossible for an animal to leave the hospital and have any money collected or a card destroyed without the fact showing up in the recording system, which also gives us a simple, easy method of recording department incomes, and gives us an itemized account on the white card of the services performed.

The cards are filed away alphabetically in a yearly permanent file, and we can refer to them from time to time as cases return, and in case of any dispute we have a complete record and can check against our daily hospital chart for the record of treatment administered.

Note: Dr. E. B. Dibbell of Baltimore, gave us, several years ago, the outline of the post card and hospital chart and we wish to credit him therewith.

AMBASSADOR DOG & CAT HOSPITAL,
3684 Beverly Blvd., Los Angeles.

Tonsillectomy In Dogs

By L. E. CASEY,
Dallas, Texas

THE majority of dog owners do not know that a dog has tonsils. When, upon examining a dog, the fact is mentioned that the tonsils are inflamed or enlarged, the owner usually expresses susprise and is usually much interested and asks a good many questions about them.

I think it is advisable, if the owner seems interested, to show him the tonsils. This is easily done by using a mouth speculum, a headlight and pressing the tonsil out of its hiding place, with the tongue pulled forward.

TONSILS are the source of many ailments in dogs. They are part of the alimentary tract and, in young dogs, often become inflamed and enlarged, reflecting disturbances in the stomach, intestines, liver and pancreas. When the tonsils are inflamed in the young dog, along with symptoms of some other condition, it is usually well to ignore them and treat the other condition. When the other disease condition is corrected, the tonsils usually subside to normal size.

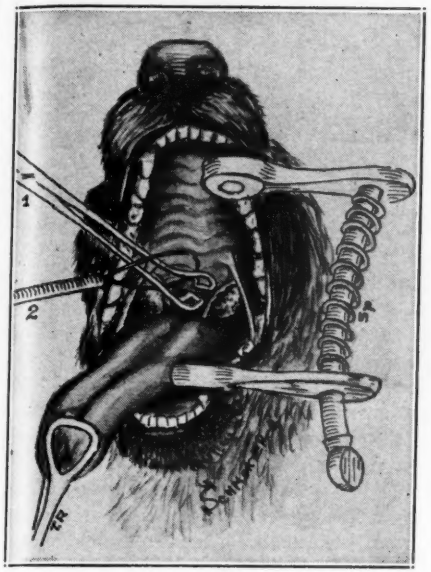
We see a good many cases of acute tonsillitis in dogs. It resembles very much the same condition in the human, and usually responds to the same line of treatment. We paint the tonsils twice a day with a two per cent solution of silver nitrate; use some nonblistering counter irritant on the outside, in the throat latch region, and give a mild cough medicine containing codeine to relieve the pain. We do not recommend removing tonsils when they are badly inflamed. It is best to treat them for a few days and if they are still very much enlarged and the crypts seem to harbor pus and mucus, then they should be removed.

Diseased tonsils are responsible for dry, hacking coughs, frequent vomiting spells, irregular appetite, loss of weight, lack of vigor and sometimes for a fluttering noise in the throat. When a dog is brought to our hospital with a history of any of the above conditions, or showing evidence of in the body, we always make a very careful examination of the tonsils. Sometimes we find one or both tonsils greatly enlarged, hanging out in the throat, fluttering as the dog breathes and causing a cough. Others are not so large; but, on careful examination, one can find pus and mucus in the crypts. Others, although they appear normal, are extremely tender and sore when pressure is applied at the base. Tonsils found diseased to this extent should be removed. Again, we sometimes find a physical condition in dogs that we feel is caused from diseased tonsils, although the latter appear normal on all tests. Usually, in such cases, when the tonsils are removed we get gratifying results and feel that we were justified in taking them out.

In this part of the country, there are a great many bird dogs and we see far more diseased tonsils in these working dogs than in other breeds. I don't know of any way to please a bird hunter more than to relieve his favorite pointer or setter of a chronic, hacking cough, that has been bothering it, for a year or so, while hunting.

THERE are two points that require considerable thought in making a tonsil examination. First, do not be in too much of a hurry to remove the tonsils from young dogs. Give them a chance to recover under treatment and they usually do, in a short time. Second, do not hesitate to remove the tonsils from a grown dog if they appear to be causing trouble.

Tonsillectomy in a dog is not a very complicated operation. The accompanying illustration gives a very good idea of the instruments used and the technique of the operation. I always give the dog from one-half to one and one-half grains of morphine about 45 minutes before operating. With



Courtesy, H-G Laboratories

Illustrating the Technique and Instruments Used in Tonsillectomy

the dog properly restrained on the table, an assistant to hold its head and a mouth speculum in place as illustrated, I make two injections in the base of each tonsil, using about 0.5cc of a local anesthetic for each injection. At present, I am using Haver-Glover's Anadolar.

After giving the anesthetic, I wait a few minutes. Then I place an ordinary tonsil snare, such as is used in human surgery, around the base of the tonsil, using a pair of blunt forceps to be sure to get all of the tonsil in the snare. Following this, press the snare and cut the tonsil off smoothly at the base. Repeat this procedure on the other tonsil. I don't believe we have to worry about hemorrhage. I have never had any noticeable hemorrhage following the operation and since the dog is under the influence of morphine,, he stays quiet for several hours. Usually a dog, following a tonsillectomy performed in the afternoon, will be up and around the next morning and will want to eat. Of course, pain will be noted when he swallows. We usually give soft feed for a couple of days and although we examine the throat once or twice a day, we very seldom have to give further treatment.

* * * *

THIS SPECIAL ISSUE

(*Continued from page 461*)

growth of the dog food industry of recent years emphasizes the necessity for veterinarians to discard empiricisms and prejudices that have long obtained, and approach canine nutritional problems in the same critical, scientific manner that is routine in the feeding of farm animals. Doctor Meyer's article contributes to this end, as does also Doctor Schroeder's article. The increasing prevalence of trichuriasis and filariasis are but two more examples of the need of the average veterinarian for the information supplied by this special issue, which in the beginning it was said is primarily for the experienced; actually the average need it even more.

CREDIT for the excellence of this special issue is due to Dr. J. F. McKenna, under whose editorial supervision it was prepared, and the corps of able collaborators whose aid he enlisted. Each is a recognized authority on the subject he discusses. Each has achieved outstanding success in his field and with but one exception, each is a veterinary practitioner of national prominence. Emphatically it is a practitioners' journal; but it will be found of scarcely less interest and value to veterinarians in all other lines of professional work.

Regrettably, the limitations of space compel us to defer until next month, the publication of six splendid discussions prepared for this issue—articles by Drs. J. F. McKenna, O. A. Longley, L. H. LaFond, A. R. Theobald, R. T. McLean and John W. Patton. To them, and to those whose articles appear in this issue, for itself and on behalf of its readers, VETERINARY MEDICINE acknowledges indebtedness.

The Author.

The Treatment of Whip Worm Infestation In Dogs

By J. GILBERT HORNINNG,
Houston, Texas

THE literature on this subject reveals a wide divergence of opinion as to the most effective method of combating whipworm infestation in dogs; however progress has been made lately in the general acceptance of the pathogenic rôle this parasite plays. It is associated with cecitis, colitis, dysentry ,and other grave gastro-intestinal disorders, accompanied by nervous disturbances and a secondary anemia and even death. Up to the present time, there has been no drug of any practical value that was commercially available for field use in canine practice. Miller, in 1920, reported verminous colitis in dogs and recommended its surgical treatment. Horning ,in 1924, reported cases of verminous cecitis from whipworms and the surgical removal of the ceum and, lately, Theobald reported the successful removal of whipworms in dogs by opening the abdominal cavity and injecting a suspension of santonin (one to two grains in glycerin and water), directly into the cecum by means of a hypodermic syringe.

THE main difficulty in treating trichuriasis, as suggested by Hall, in 1923, is due to the fact that the usual anthelmintics may pass by, instead of through, the ileoceal valve, and continue down the colon and fail to reach the worms, which for the most part, collect in the cecum.

Fig Latex

AS reported by the writer some years ago, in VETERINARY MEDICINE, Leche de higueron—the fresh latext of the fig, *Ficus laurifolia,* when administered orally and in the proper dose, was the best treatment for whipworms known. In view of the splendid results obtained also with the sap of *Ficus elastica* and *Ficus glabrata,* there is a wonderful opportunity to develop this drug in a commercial way. Investigation along these lines by veterinary supply houses or interested drug houses should be productive of much good. My friend and colleague, Dr. Fidel Ochoa, Director of the National School of Veterinary Medicine at Bogata, Columbia, should have a wonderful opportunity to carry on this investigation. The Caldwells demonstrated that the drug remains active even after standing a year, hence there is no reason why it could not be developed commercially in a satisfactory manner.

Chandler, in 1928, Hall and Augustine, in 1929, stated that Leche de higueron comes from the *Ficus laurifolia.* Paez, in 1914-15 said it is obtained from the *Ficus glabrata. Shapiro,* in 1925, successfully treated five cases with the sap of *Ficus elastica.* Robbins, in 1930, showed the same results with Leche de higueron from the *Ficus glabrata* as from *Ficus laurifolia.* Robbins, in 1930, in working with Leche de higueron obtained from Caldwell and prepared for Caldwell by Dr. M. A. Villalobos, in Santa Marta, Columbia, established the fact that the active principle is an enzyme, which he named Ficin and that it digests Ascaris in a dilution on 0.1 per cent in one and one-half to two hours. It was further demonstrated that Leche de higueron digests ascaris in vitro, and removes ascarids, Ancylostoma and Trichuris from dogs, and after oral administration can be found in the large intestine and stools of the dog, showing that it reaches these worms in active form.

As reported by the Caldwells, in 1929, two treatments when given remove practically all the whipworms, and it is as equally effective in the removal of ascarids. Hall, in 1927, while working in Nicaraugua with Leche de higueron, observed it was the only drug that could be depended upon to remove whipworms practically every time. Fernan-Nunez, in 1927, reported that the natives of Columbia had employed it for centuries in the treatment of intestinal parasites. The Caldwells reported (1929) that the drug has been shipped from South America, and when shipped in dark green bottles and placed in a cold room or a refrigerator until used, almost a year later, was very effective. However, the cost of obtaining and shipping in this way makes it rather out of the question, commercially, at the moment.

Hexylresorcinol

Lamson and his associates, in 1930 and 1931, demonstrated the possibilities with hexylresorcinol for the removal of ascarids, hookworms and whipworms, and, inasmuch as Leche de higueron is at the moment unattainable, hexylresorcinol is the drug of choice.

LAMSON, Brown and Ward, in 1931, in their report of hexylresorcinol used the white crystals in olive oil, vegetable oil and glycerin. They also used paraffin oil and found that its effectiveness was reduced when dissolved in vegetable oil or glycerin, but this could be counteracted by increasing the dosage. The toxicity of this drug on dogs is practically nil. He gave two dogs daily doses of one gram of crystals of hexylresorcinol for nine days without inducing any symptoms whatsoever. On autopsy they showed no gastro-intestinal irritation or any other disturbances. It can be given repeatedly, without fear of intoxication or of any ill effects, even if the cathartic fails to act properly or if not given at all. Amounts up to three grams were given to approximately 190 dogs without signs of intoxication. Hexyrlesorcinol is a local irritant and causes some transient irritation of the stomach, but this quickly passes away. Molloy describes the chewing of the capsules containing crystals of hexylresorcinol and says it causes a tingling sensation followed by numbness of the tongue and the blanching of the buccal mucous membrane. In one or two cases

peeling shreds of the superficial epithelial layers were noted, but the action was entirely superficial and its effects rapidly disappeared.

THE writer, out of 25 cases treated, had two fail to retain the medicine. One, a Doberman pinscher, was given three crystoids; the other, a Scottish terrier was given two crystoids. Repetition of the treatment in a few days was successful. Hexylresorcinol reacts on the gelatin of capsules in the presence of heat and moisture and the capsules are soon rendered unfit for use. Later, chocolate-coated sugar pills supplied by Sharp & Dohme were used. These pills were found to be fairly stable and gave as good results as the freshly filled capsules. Recently Sharp & Dohme placed on the market a hexylresorcinol crystoid that has proved very satisfactory. Each crystoid contains 0.2gm. of hexylresorcinol. They claim it is a special form of crystaline hexylresorcinol designed for use as an anthelmintic.

In working with dogs, the writer used a smaller dosage than that recommended by Lamson. My first procedure was cleaning the gastro-intestinal tract with milk of magnesia, usually given direct or in milk

the afternoon before treatment, in cases where the stools were normal. In constipated or badly constipated dogs a full dose of castor oil was given, the constipation relieved and the dog placed on a soft diet for several days, then given the milk of magnesia preparatory treatment. Consideration is naturally given to the age, physical condition and degree of infestation from egg count in all these cases. The dosage varies accordingly. As only a limited number of cases have been treated, further details as to dosage have to be worked out, and dosage quoted herewith, is approximate. Dogs ranging from 2 to 6 pounds were given 1 crystoid; 6 to 15 pounds, 2; 15 to 30 pounds, 3; 30 to 40 pounds, 4; 40 pounds and up were given 5 crystoids.

Heavily infested cases were given larger doses. Dogs were given the hexylresorcinol crystoids about 10:00 A. M. The dog was permitted to have his water bowl in the cage, and after taking the dog for a walk, the crystoids were given and the dog replaced in his cage. Most of them drink water on their return. In some cases phenolphthalein was administered at the time crystoids were given. In some the crystoids alone were given and followed in 12 hours with milk of magnesia. In others, mineral oil was given in large dosage with a stomach tube and a larger dose of hexylresorcinol. For results with Trichuris, mineral oil proved best, then phenolphthalein and crystoids with magnesia. Due to practically no toxicity, the hexylresorcinol crystoids were chosen in cases of dogs that reacted unfavorably to tetrachlorethylene and for old dogs and those with sensitive stomachs. Some dogs were given our regular worm treatment for all types, substituting hexylresorcinol for tetrachlorethylene and followed in 48 hours with hexylresorcinol crystoids and mineral oil. The results obtained in the limited number of cases treated, 25, justify further investigation. Hexylresorcinol, next to Leche de higueron, has proved the most effective agent against whipworm, roundworm and hookworm infestations.

Ernest Carrol Faust, M. D., New Orleans, reports having cured several longstanding cases of seat worms in persons (*Enterobius vermicularis*) by oral administration of hexylresorcinol crystals and high enemas of S. T. 37.

It is my plan to give hexylresorcinol crystoids and mineral oil by stomach tube when the patient is prepared as already stated, and the following morning give a high enema of S. T. 37. It is well to bear in mind that in many cases of trichuriasis, ascariasis and ancylostomiasis also are present.

REFERENCES

Miller, Frank H., 1920; Verminous Colitis of Dogs, its Medical and Surgical Treatment. *Jour. Amer. Vet. Med. Assoc.* pp. 185-195. Nov. 1920.

Horning, J. G.; Cecectomy in Dogs. *Veterinary Medicine.*

Theobald, A. R.; *Veterinary Medicine*; May, 1935, as reported by Damon, pp. 220.

Hall, Maurice C.; 1923. Notes on the present status of Anthelmintic Medication. *U. S. Naval Med. Bulletin* XVIII, 673-679.

Horning, J. G.; Whipworms in Dogs, *Veterinary Medicine.*

Chandler, Asa, and Chopro, R.N.; Anthelmintics and Their Uses. Williams and Wilkins, Baltimore, 1928.
more, 1928.

Hall, M. C., and Augustine, D. L.; *Amer. Jour. Hyg.*, 9-602-1929.

Robbins, Benj. H.; A Proteolytic Enzeme in Ficin, the Anthelmintic principle of Leche de Higueron. *Jour. of Biological Chem.* Vol. LXXXVII, No. 2, June, 1930, pp. 251-257.

Caldwell, Fred C, and Elfredo, L; A study of the Anthelmintic efficiency of Higuerolatex in the treatment of Trichuriasis, with comment as to its effectiveness against Ascaris infestation. *The Amer. Jour. of Trop. Med.* Vol. 1x, No. 6, Nov. 1929. Pp. 471-482.

Hall, Maurice C.; 1927. Statement to International Health Division, Rockefeller Foundation.

Lamson, P. D., Brown, H. W., Robbins, B. H., and Ward, C. B.; Field Treatments of Ascaris, Ancylostomiasis, and Trichuriasis with Hexylresorcinol. *Amer. Jour. of Hyg.*, Vol. XIII, No. 3, pp. 803-822, May, 1931.

Lamson, P. D., Brown, H. W., and Ward, C. B.; Hexylresorcinol in Canine Ascariasis, *North Amer. Vet.*, Jan. 1931.

Molloy, Daniel M.; The treatment of Hookworm and other intestional Helminth Infections with Hexylresorcinol under Field Conditions in Central America. A prelimiary report. *Sou. Med. Jour.*, Vol. XXVI, No. 7, pp 575-583, July, 1933.

Brown, H. W.: The treatment of Ascariasis and

Promotion of Small Animal Practice

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DR. F. E. McCLELLAND
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EVERY business and professional man knows that if his work, in volume and quality of service, is at a standstill, he is, in plain words, "slipping." To avoid retrogression he must constantly progress, at least to the extent meeting intelligently the changing and improved conditions and methods and advancements of science. Otherwise he is passed by in the race we call life. He must associate, encourage and cooperate with others in the same or allied professions or industries; he must be able to visualize and understand his own and others' failures and successes. This creed is the heart and mind controlling the aims, objects and purposes of the American Animal Hospital Association.

Our local, state and national associations cannot favor one group of their members more than another. A group which needs and must have special, detailed development is the small animal practitioners. To achieve this, the American Animal Hospital Association was formed. Every member of the A. A. H. A. must be also a member of the national association and of his local veterinary association. The purpose of the A. A. H. A. is to strengthen that part of the veterinary structure which needs it most, without in any way detracting from the best interests of any other group.

A review of the policies and activities of the new association to date, will reveal the effort already put forth in this direction. Decidedly active standing committees have in their charge the supervision, recommendations upon and promotion of the following subjects. To protect and promote the professional interests of veterinarians engaged in the hospitalization of small animals; to disseminate helpful information among owners of small animals; to promote cooperation between hospitals, and to standardize methods and practices in animal hospitals. This constitutes a part of the program to which the A. A. H. A. is committed.

Naturally, an organization founded for the advancement of the profession and for the protection of its members, must have standards of practice which must be maintained for one to be eligible to membership. The American Animal Hospital Association has set up requirements with regard to hospital buildings, equipment and practices that are not too high. If they were lower, no particular benefit could result from such an organization. They are, however, fair, practical, working standards that every progressive practitioner should wish to maintain, regardless of the association. On this basis, the A. A. H. A. will forge ahead with the assurance that methods of practice employed by members are uniformly and consistently commendable.

Public relations and promotional activities for an aggressive program are being

developed along sound, ethical lines. It will encourage the ownership of pets; educate the public in their care during health and disease; acquaint the public with the services rendered by veterinarians and the advantages of complete veterinary service. It is definitely constructive and desirable for the veterinary profession. The association will utilize every ethical means to combat the ill effects of adverse propaganda that is now widely circulated.

Research, clinical information and information on business aspects of practice for its members are additional services rendered by the association. At the two regular meetings of the A. A. H. A., already held, one in Cincinnati and one in Chicago, considerable discussion of these subjects resulted in information of inestimable value for those in attendance. All members are being periodically furnished with reports of material benefit not only to increase their efficiency, but to minimize the present confusion and dissatisfaction of the layman caused by lack of uniformity in methods, and lack of cooperation and understanding between members of the profession.

Article II of the constitution and by-laws of the association, summarized its objects and purposes as follows:

To provide the best possible veterinary service and hospital facilities for the care and treatment of dogs, cats and other pets, including caged birds.

To protect and promote the professional interests of veterinarians engaged in the hospitalization of small animals.

To establish and maintain a high standard for the hospital, the equipment, the personnel and methods employed.

To disseminate helpful information among owners of small animals, to neutralize the ill effects of widely circulated misinformation, pertaining to the health of small animals and the treatment of their ailments.

To cooperate with the section on small animal practice of the American Veterinary Medical Association.

To cooperate with colleges in elevating the standards of veterinary education.

To promote progress and cooperation between small animal hospitals.

* * * *

Noma in Dogs

Noma[111] is the technical term for a spreading ulcer in the region of the lips. Wirth describes two cases, one in an eight-month-old and one in a five-month-old Bedlington terrier. At the time of observation, the dogs were suffering from a mild attack of distemper, but were extremely emaciated and weak. Ten days previously the underlip had begun to swell up rapidly, exhibiting ulceration on the surface. The examination revealed deep ulcers on either side, near the corner of the mouth, having dimensions of about four by three cm. and a similar ulcer, about three by three cm. in dimension on the inside of each cheek. The ulcers were covered with slimy, greyish pseudo-membranes. The odor was so offensive that it became noticeable at several feet distance. The adjacent lumph-nodes were swollen. Eating was rendered very difficult, so that artificial feeding had to be resorted to. In many ways the symptoms and lesions resembled those of black-tongue.

The dogs died after 1 and 21 days observation, respectively. In both cases, the postmortem diagnosis was distemper (tumefied spleen, interstitial nephritis, gastro-enteritis, catarrhal pneumonia). The bacterial film revealed the presence of numerous spirochetes and fusiform bacteria in the ulcers. The clinical and microscopical picture, therefore, conform to the description of noma as characterized in human medicine. It may be mentioned that both dogs had occasion to catch mice, which are said to harbor spirochetes quite frequently.

111 Wirth, D., 1935. Noma beim Hund (Noma in Dogs); *Wien. Tierarztl. Monatsschr.*, 22:9; 261-264.

Shock

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FEW subjects in surgery have been more discussed and less understood than shock. It is of great importance to the practitioner for the reason that it is capable of producing death following accidents and surgery.

There are many theories as to its cause. Some of these that have been more or less disproved are fat embolism, toxemia, suprarenal hypoactivity and exhaustion of the vasoconstrictor mechanism.

In the clinical management of shock the loss of fluid theory serves our purpose best. For the prevention of shock following surgery the acapnia theory has merit.

Following severe physical injury to an animal we note a rapid weak pulse, a low arterial pressure, a low venous pressure, a normal or increased blood count, a clammy skin, a decreased blood volume, sometimes nausea and vomiting a subnormal temperature, and a dilated capillary bed.

Experiments by Henderson and others have shown that it is the failure of venous return that produces the above picture, but just what causes this failure is not entirely clear. In a badly bruised limb one-half of the blood volume escapes into the tissues.

Conception of Failure of Venous Return

In a long series of experiments Henderson and his collaborators observed that in the development of shock, the fall of arterial pressure is not an early and progressive occurrence, but is rather a late and sudden development. At first, a thready pulse develops without fall, but with rather a rise, of the mean arterial pressure. This is shown in graphic records as a narrowing of the amplitude of the pulse curve, the upper or systolic pressure holding level or even rising a little, while the lower or diastolic pressure rises considerably. The pulse pressure, therefore, undergoes a progressive decrease. Finally, a quite rapid fall of arterial pressure occurs.

This sequence of events demonstrates a decreasing volume of the systolic discharges of the heart. It indicates, almost equally definitely, that the peripheral resistance of the arterial system, instead of being diminished, is increased in an effort to compensate for the decreased output of the heart. The smaller stroke volumes are balanced by constriction of peripheral arteries, and arterial pressure is thus maintained at a normal level while the flow of blood is greatly decreased. Finally, when the output of the heart is decreased to so small a volume that the utmost effort of vasomotor compensation fails, the arterial pressure falls to a low level.

The significant feature of the circulation during the development of shock is, therefore, a decreased flow of blood. To this decreased discharge of the heart, the fall of arterial pressure is secondary. Instead of a primary inhibition of arterial tone, as in syncope, the vasomotor mechanism is called upon for an extra effort.

For this view there are several clear demonstrations and no contrary evidence:

(a) Not only is the pulse thready, but such arteries as the femoral and carotid (in the dog) undergo an obvious decrease of caliber, which makes it difficult or impossible to insert, even while the systolic arterial pressure is still at a normal level, a cannula that, normally could be used easily.

(b) Although the oxygen consumption of the body is certainly not increased, but rather decreased, the venous blood drawn from the right heart, or from a large vein, contains much less oxygen than when the subject was in normal condition. With a constant oxygen consumption, the less the flow of blood, the greater the proportion of oxygen given up in the tissues. The blood normally loses about a quarter of its content of oxygen in passing from the arteries into the veins; when the flow is decreased to a quarter of the normal, the blood is deprived of all its oxygen and is completely venous by the time it flows back to the heart. This, in fact, is what occurs, and it is at a stage nearly coincident with this complete venosity of the venous blood that the final fall of arterial pressure occurs. Asphyxia of the tissues sets in and completes the ruin.

(c) An even more decisive demonstration of decreased blood flow during the development of shock was obtained by Henderson and his collaborators by means of a cardiac plethysmograph, or cardiometer. In dogs maintained by artificial respiration or by breathing air under a slight pressure, the thorax was opened; the ventricles of the heart were enclosed in the cardiometer and their volume curve recorded graphically and quantitatively. In such records, the amplitude of the stroke volume of the heart is shown to decrease simultaneously with the narrowing of the arterial pulse record. Obviously then, the cause of the thready pulse is the smallness of the systolic discharges.

Influence of Venous Pressure Upon Heart

All of this evidence might be interpreted as indicating that in shock the heart is primarily affected and that a progressive decrease in the force of its strokes affords the explanation. But such is by no means the case. On the contrary, it is possible at any time prior to the fall of arterial pressure, and for a time even thereafter, to restore the heart beat to full volume. For this purpose it is only necessary to supply to the right heart a full normal volume of blood, or of blood diluted with saline or other suitable fluid. This is accomplished, temporarily at least, by intravenous infusion. As soon as this is effected, the arterial pulse also returns to normal amplitude and arterial pressure to, or above, a normal level. Evidently the failure of the circulation in shock is not cardiac, any more than it is vasomotor. Its cause lies in the decreasing and, finally, inadequate supply of blood to the right heart. The fundamental condition is failure of the venous return.

Clinicians generally neglect the significance of depletion of the venous side of the circulation. Venous congestion is seen and properly interpreted, but not the equally important and more common venous depletion. Physiologists also, even after prolonged experience, often fail to note that, while in a normal man or animal lying on the back, the jugular vein is always distended and pulsating, in a man or animal that has been long under anesthesia and operation, the jugular pulsation largely disappears and the vessel is collapsed.

This observation is of the highest significance in elucidating the failure of the circulation in surgical shock, and the corresponding degree of failure of the venous return to the heart. It explains the failure of heart action, circulation, and arterial pressure.

In support of this conception of failure of what they termed the "venopressor mechanism," a system distinct from the vasomotor system controlling arterial tone, Henderson and Barringer made an extensive study of the mechanical relations of

venous pressure to the diastolic filling of the heart. A long series of investigations was also made by Starling and his collaborators by means of the "heart-lung preparation," which they developed especially for this purpose. On this basis Starling formulated his "law of the heart."

According to this principle, the force of the systolic contraction and discharge are determined by the extent to which the ventricles are distended during diastole. In other words, the heart action is vigorous or weak in proportion to the mechanical stimulant of venous pressure and the volume of the venous return.

The failure of the circulation in surgical shock is thus seen to consist, not in failure of the vasomotor, i. e., the arterio-constrictor, system, nor in failure of the heart, except secondarily; it is essentially dependent upon failure of the venopressor mechanism. But what is the venopressor mechanism, and why does it fall?

Nature of Venopressor Mechanism

The most clear cut answer to this question has been offered by Mautner and Pick. Their experiments show that the hepatic veins are so controlled that by their constriction the blood may be dammed up in the liver and in the portal circulation, and the flow to the heart impeded. They have demonstrated this reaction experimentally, and it may be found to play an important part in acute depression of the circulation. It seems probable, however, that in surgical shock the failure of the circulation is due not only to such an active alteration of vascular tonus opposing the return of blood from the periphery, but even more to the failure of some force normally causing it to flow back.

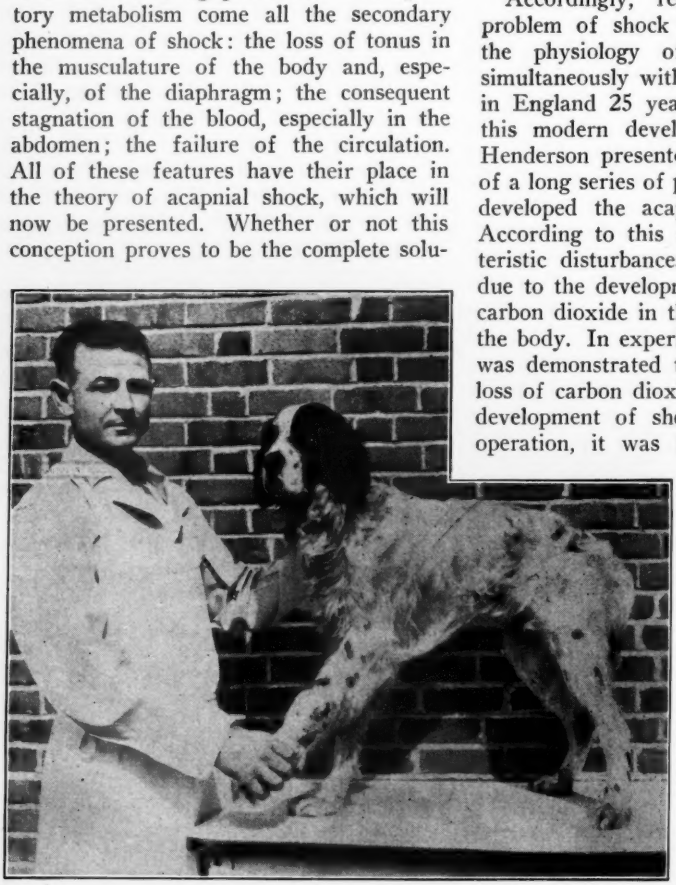
That there is a force which normally causes the blood to flow back through the venous system to the heart is demonstrated by experiments recently reported by Riml. They show that if the chest is opened and the heart is suddenly tied off so that no more blood can be thrown into the arterial system, at the same time that the right auricle is opened widely, a large proportion of all the blood in the body flows out from the venous system rather rapidly. It is quite certain that in a dead animal little or no outflow would occur, and in a moribund animal, or one in shock, the amount of blood that would flow out, i. e., the amount of the venous return that would be induced by the depressed venopressor mechanism under these conditions, would be far less than in an animal that was previously in normal condition. Reasons will be given later for believing that the factor which acts in these cases and which is, in effect, the long sought venopressor mechanism, is simply the general tone of the skeletal muscles all over the body pressing upon the capillaries and venules, and squeezing the blood back toward the heart.

Shock from Hemorrhage

Some light on these questions is afforded by the similarity of surgical shock to the condition resulting from extensive hemorrhage. This condition consists in such a depletion of the venous reservoirs and such decrease of the return to the right heart, that the volume and pressure in the great veins are inadequate to distend the heart during diastole. The immediate benefit of intravenous infusion of physiological saline or of the acacia gum solution, introduced by Bayless and extensively used by British surgeons during the war, is proof that both the heart action and arterial pressure recover as soon as the venous return is adequate. It is significant, however, that such solutions, even aside from some toxic effects of acacia, fail to maintain the circulation to anywhere near the extent that a transfusion of blood does. This fact, noted clinically by surgeons, was explained experimentally by Henderson and Haggard on the ground that hemorrhage not only decreases the volume of blood—for that volume may be replaced by an artificial solution—but that it especially depletes the supply of red corpuscles. Consequently, a form of asphyxia results, for the red corpuscles normally not only transport oxygen from the lungs to the tissues, but also afford the alkali to form bicarbonates for the transport of carbon

dioxide from the tissues to the lungs. In addition, the red corpuscles are the chief agents in maintenance of the pH of the blood against asphyxial disturbance. A blood deprived of a large part of its corpuscles, even if its volume is made up by saline, gum solution, or even by plasma, loses its respiratory function in much the same manner as does normal blood, in which the hemoglobin is largely combined with carbon monoxide.

This point brings into view the probability that, in ultimate analysis, shock from hemorrhage, from trauma, or from anesthesia and surgical operation, is a complex disturbance of the relations of oxygen, carbon dioxide, and pH in the tissues. from the resulting perversion of respiratory metabolism come all the secondary phenomena of shock: the loss of tonus in the musculature of the body and, especially, of the diaphragm; the consequent stagnation of the blood, especially in the abdomen; the failure of the circulation. All of these features have their place in the theory of acapnial shock, which will now be presented. Whether or not this conception proves to be the complete solution of the problem, it offers one aspect of practical advantage, viz., the means of prevention.



Acapnia Theory

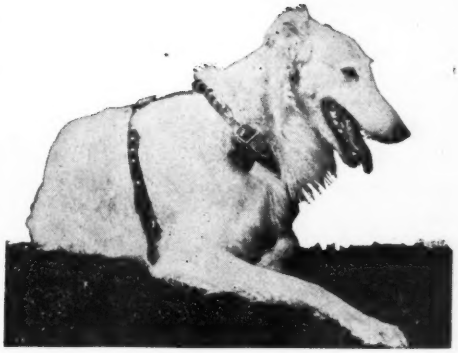
About 25 years ago there began a development in the field of respiration which in the intervening years has brought knowledge of this function in all its aspects—nervous, chemical, hemic, and intratissue—to a remarkable degree of completion. On the basis of present knowledge, no other function of the body is susceptible of such complete control as is respiration. With this knowledge, the clinician may manage the respiration of a patient almost as an engineer controls an engine.

Accordingly, recent progress in the problem of shock has its background in the physiology of respiration. Almost simultaneously with the paper of Haldane in England 25 years ago, which initiated this modern development of respiration, Henderson presented in America the first of a long series of publications in which he developed the acapnia theory of shock. According to this conception, the characteristic disturbances of shock are largely due to the development of a deficiency of carbon dioxide in the blood and tissues of the body. In experiments upon animals, it was demonstrated that prevention of this loss of carbon dioxide may counteract the development of shock. In patients after operation, it was found that the therapeutic restoration of the carbon dioxide content of the body by inhalation of thin gas mixed with air tends to restore to normal both the respiration and the circulation.

The critical discovery on which the acapnia theory was based initially was that the amount of carbon dioxide obtainable by analysis

from a sample of blood is notably decreased in this condition. There is ample experimental and clinical confirmation for this discovery. The observation of Cannon on wounded soldiers during the war verified the lowered carbon dioxide content and capacity of the blood observed by Henderson in animals. But the conception of the meaning to be attached to the amount of carbon dioxide in the blood has changed as knowledge has increased—and the terminology has changed with it. Twenty years ago blood gas analyses were made only in a physiological laboratory; now they are commonly relied upon for many clinical purposes. A decreased amount of carbon dioxide in a blood sample is now generally considered to indicate a low "alkali reserve" and a probable state of acidosis. Without entering into the theory of acidosis and aklalosis, it is sufficient to state here that there may be two types of low blood alkali, one of which is acapnia and the other acidosis in the sense in which that term is generally used.

The most practical definition of acapnia is that of an acute condition involving disturbance and depression of various functions, all of which, if treated before they have developed too far, are relieved and restored to normal by inhalation of carbon dioxide. The conception of acapnia, as first presented by Henderson, was that the depression of function is simply due to an excessive blowing off of carbon dioxide by the overbreathing under pain and during the state of anesthetic excitement. A prolonged state of excitement at the initiation of anesthesia without rebreathing is liable, when full anesthesia is induced, to result in apnea, i. e., failure of respiration. It has, therefore, become the practice of anesthetists, as they have gradually learned to apply the principles of respiration, to employ inhalation of carbon dioxide mixed with oxygen to stimulate respiration under these conditions. As a result of this use of carbon dioxide, fatal apnea under anesthesia is today a very rare occurrence. Formerly it was the principal risk of general anesthesia.



In the development of the depression of the circulation in shock, it is now clear that such overbreathing as occurs is secondary. The fundamental condition is a disturbance of the respiratory metabolism of the tissues under trauma and anesthesia, which leads through processes that are still obscure to the acapnial state. That this state may properly be defined as acapnia is proved by the fact that, given an adequate oxygen supply and a restoration of the hemoglobin to transport it, no other known procedure brings the circulation and many functions back to their normal state so effectively and so rapidly as does inhalation of carbon dioxide.

Treatment

The first thing to determine, if possible, is: Is there any hemorrhage? A tourniquet is suitable on limbs, and it also prevents the absorption of wound production and, therefore, tends to prevent secondary shock. If serious internal hemorrhage is suspected it usually is from the spleen or liver. In these instances it is best to do a laparotomy and ligate or suture the bleeding points. If the spleen is ruptured, remove it as it is impossible to suture this organ. In case of bleeding from the liver it is sometimes possible to place mattress sutures in it and by compression stop the hemorrhage. Hot towels also are of value, Blanched membranes, restlessness, a rapid pulse, a fluctuating abdomen are a few of the symptoms of internal hemorrhage.

The next step is to restore body temperature. This can be done with blankets,

hot water bottles, and super-heated air. If the patient becomes restless a sedative may be used. The perfect one has not been found, but morphine sulphate, the bromides, or some of the barbititurates may be used, keeping in mind their depressant

action. We now begin to raise the venous pressure. We can do this most readily by introduction of physiological salt solution containing 5 to 25 per cent glucose, 3cc or 4cc per pound weight. The intravenous injection must be made slowly. This solution has merit in that there is practically no shock in the administration. Also, it is cheap and convenient. We keep such a solution sterile and at hand at all times. It should be given at near-body temperature. A six per cent gum acacia is recommended by some authorities. They give us as their reasons of its superiority over saline and glucose that it has the same viscosity that blood plasma has. It is a colloidal solution, as is the protein in the blood plasma. It does not leave the blood stream as do glucose and physiological salt, which it must be remembered, are not colloidal, but crystalloidal substances. It is not expensive and can be kept easily. Most authorities feel, however, that a direct whole blood transfusion is the best method to raise the venous pressure. It is here where the unprofitable deadhead may pay for his board. We keep a donor for this purpose, using him also in other cases. We anesthetize the donor and withdraw the blood from the heart by the syringe method, using 20 cc glass syringes.

While typing is not necessary, still very occasionally one might get a reaction. All this must be done relatively early. If given too late, even blood will pass out through the capillaries as they become very permeable. In the early stages of shock with vaso-constriction the posture is unimportant. In the late stages with vaso-relaxation the lower part of the body should be raised. Unnecessary manipulation should be avoided.

We have not found adrenolin strychnine, camphor, or pituitin of much value. We do like, however, alpha lobeline and atrophine sulphate. The former has the objection of being expensive, but it is unexcelled as a respiratory regulator. Black coffee, retention enemas are of some value.

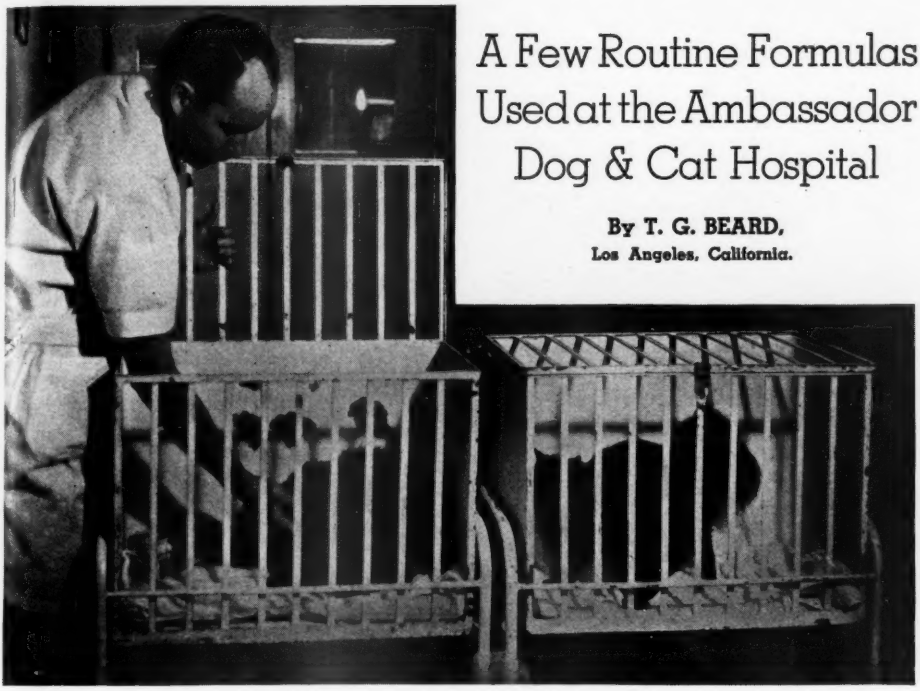
We have deviated from this procedure in a few extraordinary cases. One was a twelve-pound Scottish terrier, which following a major operation with internal hemorrhage we were unable to stop. She was just about gone, and we were unable to get a needle into her veins. Having a donor in readiness, we injected 40 cc's of a whole blood into the right heart. The pulse picked up immediately. We were able to get into the veins, and she recovered.

A large American pit bull had lain in the street for 45 minutes, following an automobile injury. Here again we experienced difficulty in getting enough return of blood in the veins to enable us to get a needle into them as they were collapsed. In this case, 80 cc's of blood were injected into the vascular area of the bulbus glandis of the penis. This produced a fuller pulse, and we were again able to use the ordinary procedure. This dog remained in shock for twelve hours.

I think it would be well that more attention be paid, on the whole, to our severely injured animals. We have seen them die unnecessarily. There is a great amount of satisfaction while administering treatment to an animal in shock, that you expect to expire at anytime, to see it gain consciousness and look about and later recover. If the client is present he is deeply impressed as he justly should be.

A Few Routine Formulas Used at the Ambassador Dog & Cat Hospital

By T. G. BEARD,
Los Angeles, California.



The Author and Pedigreed Persian Patients.

These formulas are useful, practical, and easy to prepare.

Ear Preparations

For cleansing ears we use the following solutions for irrigations:

Haglogen	5 parts
Alcohol	20 parts
Water	75 parts

This solution should be used freely and warm, (body temperature) using a regular ear syringe. The less an infected ear is probed the better. After the ear is cleansed and all the solution has been dried out of the cavity, the following formulas are used to treat the infection:

No. 1	Gentian Violet	5 parts
	Acetone	5 parts
	Alcohol	45 parts
	Water	45 parts

Take small amount in an eye dropper and place deep into the ear and remove excess so as not to soil the outside.

No. 2	Phenol	3 parts
	Glycerine	97 parts

(Add Boric Acid powder until the glycerine will not absorb any more. Let stand over night and strain.)

Place one-half eye dropperful in ear and remove the excess.

In moist types of otitis with very little infection, the following is effective:

20% solution of tannic acid
80% Glycerine

Place eye dropperful in ear and remove excess.

Eye Washes

One of the best eye washes for irrigation and cleansing of the eye and for purulent discharges and conjunctivitis is as follows:

Sodium bicarbonate	15 grains
Borax	15 grains
Sodium chloride	15 grains
Glycerine	1 dram
Distilled water	8 ounces

It is inexpensive to make.

Stimulating and Astringent Collyria

No. 1	Zinc sulphate	1 grain
	Boric acid	5 grains
	Distilled water	1 ounce
No. 2	Tannic acid	¼ grain
	Borax	2½ grains
	Camphor water	1½ drams
	Distilled water	6 drams
No. 3	Zinc sulphate	2 grains
	Camphor water	2 drams
	Sat. sol. boric acid	2 ounces

For Diarrhea in Pups and Adult Dogs

Milk of bismuth	4 ounces
Paregoric	4 drams
Therapogen	2 drams

Place in ¼-ounce, gelatin capsules and give one three times daily. For large dogs double the dosage.

Mange

Kerosene	32 ounces
Creolin	6 ounces
Oil of Tar	6 ounces
Sulphur	1 pound
Raw Linseed Oil q.s.	1 gallon

Rub into skin every other day. It gives gratifying results.

Another good oily skin mixture is:

Gum camphor	1 pound
Alcohol	1 pint
Turpentine	1 quart
Kerosene	2 quarts
Cotton seed oil	6 quarts
Sulphur (flowers)	9 ounces

Note: First dissolve the camphor in the alcohol.

Rub on the skin every third day.

A good lotion for seborrhea and mild skin eruptions is:

Therapogen	1 part

Bay rum	6 parts
Alcohol	6 parts

Rub into the skin twice daily.

Mouth Wash

Tincture iron	1 ounce
Potassium chlorate	2 ounces
Glycerine	4 ounces
Water q.s.	1 gallon

Treatment of Diseases of the Cornea

Iontophoresis is a term used to designate the application of a galvanic current to the skin or mucosa for the purpose of bringing the ions in the remedy into action.[110] In man and occasionally in dogs, it is possible to apply the electrode to the anesthetized cornea directly, but for horses, a special apparatus is necessary, in which the current is applied indirectly through the eyelid. Good results were obtained in 10 patients showing an opacity of the cornea of long standing. Cases of keratitis which exhibit structural changes and deposition of connective tissue, will not yield.

110 Wittmann, F. and H. Wähgeld, 1934. Zur Answendung der Tontophorese bei Hornhauterkrankungen. (Iontophoresis in the Treatment of Diseases of the Cornea). *Zeitschr. f. Veterinark.*, 46:9, 66. 305-21.

Handling Heart Worm Disease in Practice

By E. B. DIBBELL,
Baltimore, Md.

The Author.

IN our practice, during the past 13 years in Baltimore, routine examination of dogs presented for treatment did not include a search for heart worm disease unless the animal was past two years of age and had a history of having spent some time in the South. Even then, when an examination was made, the direct smear method was used. With the infrequency of examination and the casual search made when suspected the incidence of heart worm disease in our practice was very occasional.

Early this year, however, the writer was called to a nearby training kennel for hunting dogs. One hundred and eleven dogs were examined for heart worms by the technique given later.

In this kennel there were dogs from all sections of the country. Two were from Michigan, two from Ohio, one from Oklahoma, several from Pennsylvania, a number from New Jersey and Delaware, and the remainder from Maryland and Virginia. Of this representative group of dogs 28 per cent were infested with heart worms. One Michigan dog, the Oklahoma dog, three from Pennsylvania and all four from New Jersey and Delaware were infested. As far as it was possible to trace their histories none of these out-of-town dogs had ever been in the South and only one of them (Pennsylvania) had been at the kennels long enough to have contracted the disease there. The high percentage found was surprising. Shortly after this kennel was examined I saw, in a fair state of preservation, a 35-year-old specimen of a dog's heart filled with worms. Although considerable disintegration had taken place, there was no mistaking that it was a dog's heart with the right chamber filled with worms. This heart had been removed from a dog whelped and raised in Maryland, not far from Baltimore. The 28 per cent infestation found in the kennel, and the old specimen of a Maryland dog's heart, convinced us that we had been slipping up in our routine hospital examinations.

Since April of this year examination for heart worm is made on every dog, over a year old, coming into the hospital. Dogs to be clipped, bathed or examined for other troubles are examined for filariasis. Tabulations kept, as accurately as possible, show about 18 per cent of our large dogs and about 10 per cent of small dogs affected. The reason for the greater percentage in large dogs is probably the fact that more large than small dogs live outdoors where mosquitos can get to them; the smaller breeds being more often kept indoors, sheltered from potential vectors.

Life Cycle of the Dirofilaria Immitis

The intermediate hosts of the *Dirofilaria imitis* are mosquitos of the genera Anopheles, Aedes, Myzorhynchus and Culex. The infant filarae (larvae) are sucked up into its digestive tract by the mosquito. They pass through the digestive tract into the Malpighian tubules of the mosquito. Here they undergo a change from non-infective to infective filaria. This development takes from 15 to 35 days. During

this change the shape of the filariae alters, becoming sac-like in appearance, and then gradually resuming its original form. The larvae then migrate to the proboscis and are injected into the next dog the mosquito bites. The accompanying diagram shows the life cycle of the *Dirofilaria* and also shows the metamorphosis of the larvae through the mosquito. (Fig. 1.)

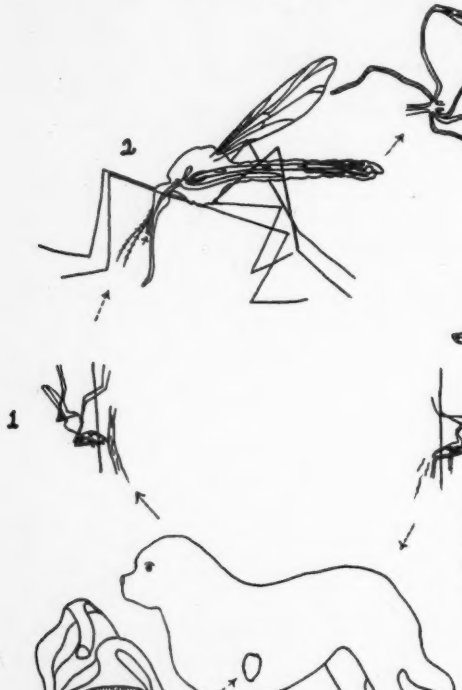


Fig. 1.

1. Mosquito obtaining microfilariae from peripheral blood.
2. Through alimentary tract to malpighian tubules.
3. Developing in malpighian tubules.
4. Passing into proboscis.
5. Injection into peripheral blood of dog.
6. Right side of heart laid open to show adult worms.

The development of infective larvae into adult worms after being innoculated into the dog by the mosquito is unknown. All investigators agree that all filarial worms found on post mortem examination appear to be adults. To what tissues the infective larvae migrate is unknown. It appears they must undergo part of their development in some part of the body other than the heart, and when nearly grown, enter the large veins and the pulmonary artery to find their way into the right side of the heart.

IT is by no means certain that the mosquito is the only vector disseminating heart worm disease. We have repeatedly demonstrated larvae in the blood of engorged ticks taken from infested dogs. Whether the larvae go through the metamorphosis from the non-infective to the infective stage in the tick is not known. Dr. Emmitt Price of the B. A. I. is soon to start experiments to determine this. Some investigators have mentioned the flea as a possible vector.

Description of the Adult Worm

The worms are slender and white in color. The male is about 12 to 18 centimeters (5 to 7 inches) long, and the female 25 to 35 centimeters (10 to 14 inches) long. The eggs hatch in the uterus of the female and the larvae are deposited directly into the blood stream. The hind end of the male is spirally coiled making it easy to differentiate the sexes of worms found on post-mortem examination.

Description of the Microfilaria

Knowledge of the larvae of the fialaria worms, generally, is still very incomplete. These microfilarae, as they are called, are small, on an average 0.2 to 0.3 mm. long. They are easily seen with the lower (dry)

microscope. Their appearance under the microscope depends on the method of handling the blood specimen for examination. For the veterinarian with simple laboratory facilities there are four ways of making reasonably quick examinations. The technique is as follows:

A. The thin smear, examined immediately.

B. The thick smear, stained.

C. Hemolysis of blood and centrifuge, no stain.

D. Hemolysis of blood and centrifuge, staining.

The microfilarae on thin smear (A) appear as wiggling slender snake like forms thrashing about between the red blood cells. Their movement attracts the eye as soon as the film is brought into proper focus. They are steel gray transparent bodies.

In the thick smear method (B), when the slide is properly prepared, there is nothing to be seen but the parasites and the nuclei of the white cells. The type of stain used determines their color.

In (C) the red blood cells are decolorized and the microfilarae appear as slender steel gray slightly curved or straight filaments. They are reasonably consistent as to size and are sharply defined; readily distinguished from lint or minute vegetable *debris* in the field.

In (D) we have the same picture as in the non-staining, C method, except the microfilarae are stained. There is less likelihood of error on the part of the novice in using this technique.

Nocturnal Periodicity

The phenomenon of periodicity affords evidence that the intermediate hosts habits are a factor in its determination. For example in *Wucherer Bancrofti* of man (a filarial disease) which is transmitted by mosquitoes (night workers) the microfilarae are far more numerous in the peripheral blood vessels at night than they are during the day, and thus are said to have a "nocturnal periodicity." In Loa Loa, also a human filarial parasite, which is transmitted by the Tananid fly (a day worker) the reverse is the case and they are said to have a "diurnal periodicity."

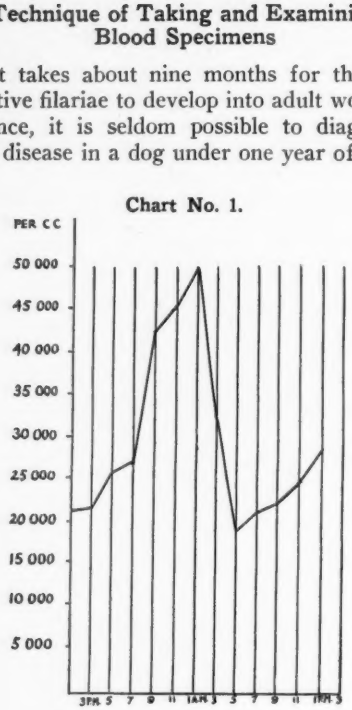
D. immitis, being mosquito transmitted (night workers), is classed as having nocturnal periodicity. E. Harold Hinton, in a recent issue of *The American Journal of Tropical Medicine* has this to say: "It seems reasonable to believe that there is a mechanism set up in the body which may be stimulated by such factors as body temperature, exercise, metabolism, etc., which will cause a release from the reservoir (lungs and other vicera) of large numbers of microfilarae into the peripheral circulation. When the opposite extreme is reached the same mechanism or another one may be stimulated to filter out a large proportion of the circulating parasites. It is problematical whether this filtration is one of simple vasoconstriction." This agrees pretty closely with the text from Veterinary Helminthology by Mönnig who says, "Several theories have been propounded to explain this phenomenon. The most probable explanation seems to be that the metabolism of the host differs during periods of rest and activity and that this affects the microfilariae. The periodicity of *W. Bancrofti* can be reversed by working at night and sleeping during the day." It would be interesting here to run a 24-hour study on infected coon hounds during the coon-hunting season, to see whether the normal nocturnal periodicity of the dog would become "diurnal" with this class of dogs whose habits are reversed by reason of resting during the day and working at night.

Chart No. 1, from Hinton's work mentioned above, diagrams the phenomenon graphically. Underwood & Wright (1933) reported from a single 24-hour study of two dogs that the number of microfilariae increased gradually from 6 P. M. until 2 A. M. when the peak was reached, after which the number of microfilariae gradually declined.

Technique of Taking and Examining Blood Specimens

It takes about nine months for the infective filariae to develop into adult worms. Hence, it is seldom possible to diagnose the disease in a dog under one year of age.

Chart No. 1.



It is easily seen that in the dog the incidence of the disease increases with age.

The usual site for withdrawing blood for examination is the saphenous vein. This requires two persons. One to hold the dog and the leg and the other to take the sample. By using the radial vein of the front leg, however, one man can usually do the job quicker and easier. Fig. 2 illustrates this.

1. Thin smear examination: A drop of fresh blood is placed on the slide, covered with a cover-slip and examined immediately. The microfilariae will be seen moving about. This method does very well in heavy infestations but is not accurate in that light infestations often will be missed. Taking the blood at night increases the possibility of catching light infestations.

2. Thick film stain method: This is far superior to the thin film for accuracy but requires considerably more time. Several drops of blood are allowed to fall in the centre of a clean slide. These are mixed together with a needle to form a single large drop which is allowed to dry, free from dust. When dry the slide is placed in a vessel of distilled water in a slanting position facing downwards, until complete hemoglobinolysis occurs. When quite transparent, it is removed and again allowed to dry free from dust. The slide is then "fixed" by passing quickly, three times, through a naked flame, and then flooded with concentrated hemotoxylin stain. This is heated almost to the boiling point over a flame for a few minutes; the stain is washed off and the slide rapidly dried and examined. Only the nuclei of the white cells and the parasites are visible. To be retained as a demonstration slide it may be mounted directly after drying in Canada balsam.

3. Non-staining centrifuge method:

a. Draw aseptically into a sterile syringe 1cc of blood from either the external saphenous or radial vein.

b. Eject the blood into a centrifuge tube containing 1cc of a 2 per cent acetic acid solution.

c. Invert the tube several times to mix the contents thoroughly. The acid hemolyzes the blood.

d. Allow to stand for 10 or 15 minutes.

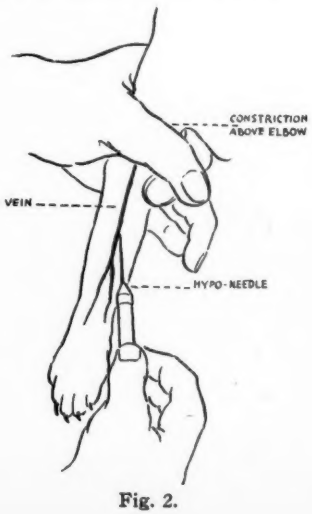


Fig. 2.

e. Centrifuge for five minutes at 1500 r. p. m. This is about the speed that can be attained by the cheap hand operated centrifuges.

f. Pour off supernatant fluid. All liquid is poured off. There will be found in the bottom of the tube a thin deposit of sediment, which is made up of shrunken cells and parasites. It is sometimes difficult to get the sediment out of the tube, but drawing the bottom tip of the tube over the backs of the finger nails rapidly a number of times agitates the material enough that a drop may be poured out onto the slide, and covered with a cover-slip.

g. Examine with the low or intermediate power objective.

4. Staining centrifuge method: This is essentially the same as the non-staining, centrifuge method and is carried out in the same manner, except the reagent for hemolyses of the red cells differs slightly and has the dye or stain in combination. The blood is mixed in several volumes of 95 parts five per cent formalin, five parts glacial acetic acid and two parts saturated solution of gentian violet in alcohol, which hemolyzes the red corpuscles and fixes and stains the larvae.

Preparing the Dog for Treatment

In physically fit, young dogs, with light infestations of heart worm, there appears to be no contra-indications for treatment with any of the several established therapeutic agents available to the profession. A drug consisting of sodium-antimony-III-bis-pyrocatechin-disulphonate of sodium has been found of value in the treatment of dogs infested with heart worms. There is also a product described as a double salt of antimony procurable that bears a good reputation.

In old dogs with heavy infestations the treatment of heartworms should be approached with care and caution. Where the animal appears debilitated or run down, the laboratory should be called on to determine the condition of the kidneys and liver. The heart should likewise be examined carefully. Any serious disorder of any of these organs are contra-indications for, at least, intensive treatment. Here, general treatment for the specific pathological condition with good nursing is in order. Treatment, in these debilitated cases with filaricide should be started with very small doses intra-muscularly. As the patients improve a switch should be made to the intravenous route for quicker results, but care should be exercised in making the change.

Treatment with Heartworm Agents

Due to the close surveillance necessary in the treatment of heartworm infestations it is best for the patient to be hospitalized and given the first series of injections under the close supervision of the attending veterinarian.

The accompanying chart (No. 2) is a

Chart No. 2.

Degree of Infection	Date of Entry	Owners Name	Breed	Treatment Schedule — April 1	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	May 1	2	3	4	5
A	4/30	France	Female Pointer	2.0	2.5	2.5	R 1.5	1.5	1.5	2.0	R 2.0	2.5	2.5	2.5	3.0	D 3.5	3.5	3.5	3.5	3.5	3.5	D 3.5	2.0	2.5	1.5	1.0	D 0					0
A	4/30	France	Male Pointer	1.5	2.0	2.0	R 1.0	1.0	1.0	1.5	1.5	R 1.5	2.0	2.0	2.0	2.5	D 2.5	2.5	3.0	3.0	3.0	D 2.0	2.0	1.0	1.0	D 1.0	3.0	3.0	3.5	3.5	3.5
A	5/5	Reifsnyder	Female Liver Pointer	2.0		2.0		2.0	2.5	2.5	2.5	R 3.0	3.0	3.0	3.0	2.5	D 2.5	1.5	1.5	1.5		0				0						
C	5/5	Reifsnyder	Female Blk Pointer	2.0		2.0		2.0	2.5	2.5	2.5	R 3.0	3.0	3.0	3.0	2.0	D 2.0	2.5	2.5	4.5	3.0	D 3.0				0						
A	5/6	Owens	Male Setter		3.0		R 3.5	3.5	3.5	3.5	R 3.5	3.5	3.0	3.0	2.5	D 3.5		3.5	4.0	4.0	D 4.0		1.5	3.5	3.5	D 3.5					0
D	5/6	Mencken	Male Bull Dog		1.0		R 1.0	1.0	1.0	1.5	1.5	R 1.5	2.0	2.0	2.0	2.5	D 2.5	2.5	2.0	2.0	D 2.0		2.5	2.5	2.5	D 2.5	2.0	2.0	2.0	2.0	2.0

simple affair designed for routine handling of cases. After the initial examination of the patient is made the degree of infestation is indicated by letter "A", "B", "C" or "D" entered on the chart and the tentative outline of treatment is mapped out and charted. On the chart appears dates for three weeks' treatment for each case, together with space every fifth day for indicating by letter symbols the degree of infestation found on re-examination of the blood. In this manner a fairly accurate picture of the progress being made in the treatment of each case can be visualized. This is quite important where considerable numbers are constantly being treated in the hospital.

In making examinations of the blood we use a single ruling Leitz slide. As a "rule of thumb" index of the degree of infestation found we have classified our findings as follows:

"A" infection denotes a count of more than 100 microfilariae on one slide, using one of the centrifuge methods.

"B" indicates a count of more than 50 and less than an "A" infection.

"C" indicates a count of more than 25 and less than a "B" infection.

"D" indicates a count of one or more microfilariae and less than a "C" infection.

It is realized that this method of noting progress in treatment is far from having the accuracy of laboratory technique but in our practice it serves very well to keep us informed as to the progress of the case. The clinical state of our patients, other factors not complicating the picture, follow the evidence of the decrease of larvae as noted on our charts. As to the remedy and the dosage experience is the best guide. The doses suggested by the manufacturer of the product being used may be relied upon, until experience is attained.

Wright & Underwood using the first of the remedies described in this paper conclude that a suitable course of treatment with this drug results in the permanent disappearance of the microfilariae from the peripheral circulation, in the sterilization of female worms and in the eventual destruction of some or all of the adult worms in the heart and pulmonary artery. This drug can be used intramuscularly without noticeable local reaction. This method of administration of the drug is particularly useful in the case of old, heavily-infested dogs, where care has to be exercised in regulating the dose and in small breeds where the subcutaneous veins are small and difficult to pick up.

The action of this drug is cumulative and exerted over a relatively long period. This is probably an advantage, since if an agent were found specific enough to destroy the adult worms with, say, one or two doses it would be highly dangerous. When it is understood that the worms killed by the medicament are carried by the blood stream into the various branches of the pulmonary artery, are encapsulated in the parenchyma of the lung, and after a time, are absorbed it is easy to understand how the destruction of a large number of adult worms, at one time, would result in endangering the life of the dog from embolic pneumonia, toxemia, or foreign protein poisoning.

Again quoting Underwood & Wright, "In conclusion it must be emphasized that treatment for heart-worm infestation in the dog calls for the exercise of good judgment on the part of the veterinarian administering the treatment. A careful physical examination should be made of every animal prior to treatment, and due weight should be given to the presence of chronic or acute disease conditions which might influence the tolerance of the animal for the drug used. Careful attention should be paid to the degree of infestation and the drug should be so administered as to avoid the destruction, at any one time, of too large a number of adult worms with a consequent danger to the life of the host. In many of these matters experience alone can form the basis of rational procedure, but until experience is gained, careful attention should be paid to the various points brought out in this paper."

Reactions and Symptoms Following Use of Heart Worm Drugs

Probably the most common reaction to the drug is swellings about the head and swelling of the testicles of the male and in the regions of the vulva and mammae. These swellings are usually evanescent and unless accompanied by high temperatures (104° to 106° F.), are not to be worried about excepting that the dose should not be increased until a tolerance has been acquired. Where temperatures are high and gradually recede there is no danger. But when high temperatures suddenly drop to sub-normal the animal should be treated for shock immediately and all heart-worm treatment suspended until the patient is stabilized. There is some evidence that during treatment there is a loss of calcium from the blood. Any nervous manifestations should, therefore, be treated by the administration of calcium gluconate and sedatives.

Often after treatment is started there will be a noticeable increase in the number of larvae found on examination. The theory accounting for this is that the drug has caused the adult female worms to abort, casting millions of larvae into the blood stream at one time.

Suggestions for Prevention

There is no known method of immunizing dogs against heart-worm disease. The following are suggestions for the control of the disease:

1. Dogs with heart worms should be treated, destroyed, or kept in mosquito proof quarters through mosquito season.
2. Keep stray and homeless dogs off the premises.
3. Protect dogs from mosquitos as much as possible using screens and sprays.
4. All dogs should be examined each year during the early spring season.

Problems in Dog Feeding

By A. E. MEYER, Ph.D. and H. HARRIS,
Rockford, Illinois

ANIMAL breeders and research workers, interested in animal feeding, have long been confronted with the problem of compounding a balanced ration—one which would supply the species in question with optimum quantities of every nutrient factor necessary for life; thus permitting the animal to develop and maintain itself in perfect condition on a minimum of food intake.

Experiments and observations in practical life have shown that the organism will usually thrive best on a wide variety of foods, and that the ideal diet may vary in its composition, even within a large amplitude.

Some investigators try to work from theoretical reasoning. For instance, they believe the diet should be composed of elements of nutrition in exactly the same ratio as those elements are found in the entire body of the animal. However, it is easy to show that such reasoning is not admissible. In the organism, carbohydrates are usually low because they are readily metabolized; on the other hand, certain inorganic compounds, such as calcium phosphate deposited in the bones, have a slow metabolic rate.

Another theory started with the reasoning that milk from the mother animal is a food product, prepared by nature for nourishing that particular species, and consequently should represent the ideal composition for a diet in later life. Milk, however, is essentially a food for the organism only during its earliest days of life, and is adapted for that specific purpose.

We know, perfectly well, that milk does not contain iron in any appreciable amount, and will bring about a condition of anemia if used as an exclusive food for an animal beyond the earliest stage of development.

It must be considered that pups in the period of lactation do not move around much. Their activity begins only after they reach the age when additional food is supplied along with the milk. The expense of muscle movement is primarily governed by energy derived from carbodydrates. Therefore, the requirements of the organism naturally shift toward a higher carbohydrate intake than is found in the exclusive milk diet of earliest puppyhood.

THE theory of using the composition of milk as a standard for feeding has led to some absurd conclusions. Such conclusions, in combination with recent findings concerning the value of fat in nutrition, have been used as the basis for various suggestions regarding dog feeding, and it can be said that the consequences may be dangerous. On the basis of an analysis of dog's milk, it has been claimed that the ideal food for a dog should supply 70% of the caloric intake from fat; 20% from protein; 10% from crabohydrate. Such a claim can be made only from rather incomplete knowledge in problems of dog feeding, because it must be known that fat fed at such a level will disagree thoroughly with the nutrition of the dog.

Recently D. T. Mayer[1] published an analysis of rat milk, calculated on solids. He found 55% fat, 30% protein and 15% carbohydrate. We have rather extensive experience in nutrition of the rat, since this animal has been used with preference for innumerable experiments along this line. Rats are fed optimum rations, but it is certain that such rations contain fat at a considerably lower level than is found in rats' milk. The theory as presented must have been based on erroneous conclusions.

It is known that the organism easily transforms carbohydrate into fat. It is quite possible that this ability for transforming is acquired only after a certain age, and that the newly born is not yet able to perform such a task. This at least would explain why the milk of a certain species is far higher in fat content than is the desirable basal food for the older animals of the same species.

THE problem of conversion of one food ingredient into another may also give us an explanation as to why there can be such a wide latitude in the composition of foods on which an animal will thrive. There is not only a process of assimilation of food products, but also the process of catabolism and transformation of certain ingredients. It may be quite possible that this function is necessary for general well-being. The apparently useless and valueless crude fibre serves a very definite purpose in digestion, though an organism might live without it.

It can be conceived easily, that an excess of a certain type of nutrient material might be of benefit to keep the body in practice for this chemical transformation and catabolism. Such cell activity may be necessary for the defense mechanism of the organism. Animals can be brought up protected from any type of infection, but such animals are more subject to disease whenever they are exposed, than are animals growing up in normal surroundings. Analagous conditions may prevail in the field of nutrition.

THE only positive statement which can be made about a balanced ration is this: It should contain, in sufficient quantity, every nutrient factor which is necessary to support the normal functions of life. The number of known factors essential for the accomplishment of this purpose is constantly increasing. Recent research brought to light the fact that the *quality* of fat supplied in the food is of considerable importance; that certain unsaturated fatty acids must be present if life is to be maintained. Most natural fats contain unsaturated fatty acid in sufficient quantity; consequently this need had been overlooked until recently. The real danger of a deficiency might arise, however, from

feeding hydrogenated, i. e., artificially hardened fats, and is a factor in nutrition which should not be altogether neglected.

A certain dog food which is made in two styles, horse meat or beef, has been criticized because the beef product contains a larger quantity of fat than the horse meat preparation. A commercial analysis of the two will show a disagreement in fat content, of course, but it is necessary to consider the type of fat in order to give an explanation. Beef tallow is a hard fat containing essentially saturated acids. A comparatively high quantity is necessary for the purpose of adequately supplying unsaturated fatty acids. Horse fat, on the other hand, contains higher quantities of unsaturated acids. H. A. Schuette[2] gives the following analysis:

Oleisl	46.8%	fatty acids
Linoleic	11.8	" "
Linolenic	4.48	" "

The high percentage of unsaturated fatty acids in horse meat led G. Platanov[3] to a theory that the reason for the comparative immunity against tuberculosis that the horse possesses may be due to this particular factor, and that feeding horse meat to tuberculous patients, as is done in some countries, may find its logical explanation on this basis.

Research for the object of comparing the food value of different meats has confined itself in the past mostly to the protein side. The differences as pointed out above, however, suggest that there may be just as much, if not more, importance in the composition of the *fat*. Such research might serve to bring about a decision in connection with the preference of one meat over the other.

STILL another problem in nutrition seems to have found little attention so far in physiology. If an animal, at a certain normal metabolism, should have need of a definite ratio between the three main food ingredients—what change will occur if the basal metabolism is raised, for instance, by increased thyroid activity? Will the increased metabolism apply to every food ingredient in the same proportion, or will it be relative for one or two of them?

Only extensive studies made on dogs fed a routine diet and kept on a standard thyroid feeding, will shed any light on this

question. The objection might be made that animal breeders are dealing with normal dogs and not with those suffering from thyroid disturbance. However, it has been shown by Stockard that different breeds of dogs show a considerable variation in the relative size of the thyroid gland. Larger dogs have a smaller gland in comparison with their body weight, though this is not in strict proportion to the size of the dog. We can conclude from this, that a larger dog has a relatively lower metalobic rate. His food consumption obviously is smaller in ratio to his weight than that of a smaller dog with a relatively larger thyroid.

Do both types of dogs require the same basal diet? We do not know—but we do know that a certain moderate excess of protein is metabolized easily, whereas fat and carbohydrates may have a tendency to cause excessive fat deposits. For this reason, it is safer to err in the direction of the slightly higher protein intake than in the direction of excess fat. If this were not the case, it would be impossible to present a general food for all breeds of dogs, because there is no other animal species which shows larger variations than the canine family.

1 D. T. Mayer, J. Nutr. *10*, 343 (1935).
2 Schuette, Garvin & Schwoegler, J. Bio. Chem. *107*, 635 (1934).
3 Platonov, Amer. Rev. Tuberculosis, *21*, 369 (1930).

Non-Parasitic Skin Diseases

By S. W. HAIGLER,
St. Louis, Mo.

The Author.

UNDER the heading of non-parasitic skin diseases we would include all skin diseases or affections not directly due to external parasites. However, no attempt will be made at this time to enter into a detailed discussion of all of the conditions, but rather to generalize. After all is said and done and the whole thing is boiled down, what we have left is *eczema* or *dermatitis.*

Eczema is defined by Webster as "a cutaneous disease characterized by inflammation, redness, itching and the formation of vesicles which exude a water substance that evaporates and leaves the skin covered with a crust." It is derived from the Greek word "ekzeim"; ek—out and zeim—to boil. Therefore generally speaking, it means a boiling out from within. It has been defined by some as "a blanket expression covering a batch of ignorance." Personally, I do not like the use of the the term, but it has been used for years by the medical and veterinary professions.

Dermatitis is defined by Webster as "inflammation of the skin." This too covers a world of territory, but regardless of the term used, the condition remains the same.

While a diagnosis of eczema will perhaps require less explanation than a diagnosis of dermatitis, I feel that each is a definite disease entity and should be treated as such. And inasmuch as I have become accustomed to using the term dermatitis in practice, I shall use it henceforth in this discussion.

Dermatitis in the dog is a large subject in itself, and an attempt will only be made to review certain phases of the disease with particular reference as to the cause.

Etiology.—The causes of dermatitis are numerous and variable and the following summary of etiological factors may be considered:

1. Poor sanitation—dirt and filth.
2. Intestinal parasites.
3. Blood parasites.
4. Nutritional disturbances.
   (a) Alergical reactions—protein poisoning—sensitization to certain foods.
   (b) Foods of inferior quality—poor nutritional value—lack of proper mineral and vitamin balance.
   (c) Garbage and carrion waste—engorgement of huge quantities of garbage, causing digestive derangement.
   (d) Improperly constructed diets—too much or too little protein, carbohydrate or fats.
5. Improper metabolism—due to pathological conditions of the digestive tract.
6. Temperature—humidity—burns—freezing.
7. Improper grooming.
   (a) Neglect—matted coats, etc.
   (b) Poor workmanship—clipping too close—amateur stripping.
8. Infectious diseases.
   (a) Primary cause.
   (b) Secondary cause.
9. Pressure necrosis.
10. Faulty elimination of waste.
    (a) From the bowels.
    (b) In the urine.
11. Discharges from sores and wounds.
12. Chemical.
    (a) Soaps—too caustic—improper rinsing.
    (b) Parasiticides—bad choice or too strong.
    (c) Sunshine—sunburns.
    (d) Oils, from clippers—road oil—fuel oil, etc.
13. Mechanical.
    (a) Biting, fighting, bruises, etc.

There are perhaps a great many more etiological factors, and whether or not dermatitis is becoming more prevalent in pet dogs is a debatable question, but from my observations, I would say that it is.

Certain breeds of dogs seem to be more

susceptible than others, and dermatitis is more common in individuals of the larger breeds that are closely confined. I am wondering what effect our modern civilization is having on the dogs of today. I can think of three factors which I believe are contributing influences; namely, *breeding, feeding,* and *environment.*

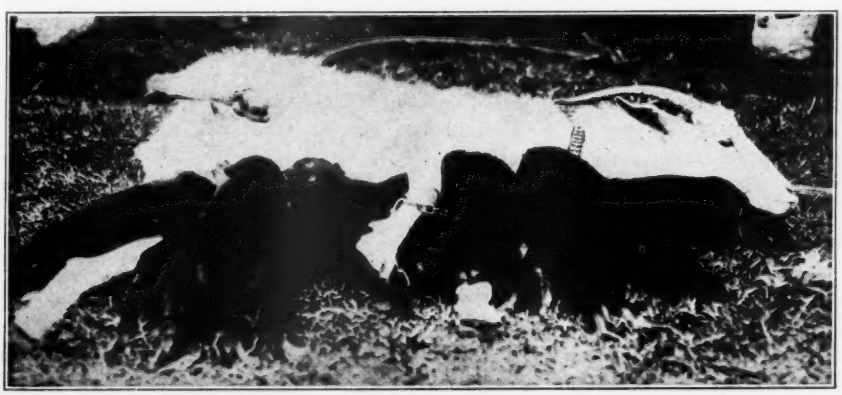
In his desire to produce individuals to his liking, man has resorted to all kinds of antics in breeding dogs. The toy or vest pocket variety was greatly in demand, and to supply that demand, the smaller individuals of the breed were mated, regardless of blood lines; sire to his dam or brother to sister, and this in-breeding in more or less degree kept up for generations. In order to produce longer and narrower heads in collies, larger and broader heads in setters, and to shorten the legs of some of the terrier breeds, breeders have ignored every principle of eugenics. Perhaps it is to generations of this folly in breeding that we should look for the real genesis of many of the physical and mental infirmities of the dog of today.

Feeding.—Again the trend of our modern civilization demands that we "reach for a can opener instead." The tremendous growth of the dog food industry in the past decade gives one an idea of the amount and kind of feeding that public has fallen for. Elaborate radio programs and advertising has resulted in pet owners switching from one brand to another, and feeding prepared foods exclusively in many instances. I am not condemning the dog food industry, because I believe that some companies are conscientiously trying to supply a good food and have a well balanced ration, but they are in the minority. The majority are unscrupulous—just plain racketeers.

Following an elaborate radio advertising program in this community, a certain brand of dog food went over with a bang, and for six months thereafter a large majority of cases of dermatitis, which were thought to be nutritional, occurred in dogs fed almost exclusively on this brand of food, and a change of diet corrected most cases without further treatment.

Environment.—When nature provides a heavy winter coat for dog it is intended to protect it against low temperatures, but what happens when this dog is kept in a house where the temperature is 70 to 80 degrees? Likewise, what constitutes the proper exercise for a dog? Do you believe that a stroll around the block on a leash, or five minutes in a vacant lot is sufficient exercise? A dog is seldom seen walking when allowed its freedom, yet some people think that a short walk each day is all that the dog needs, with no thought toward governing the diet accordingly.

When allowed its freedom a dog will eliminate frequently, leaving its mark on every tree as it were, but the pet dog of today is first thoroughly "house broken" then left in the house all day while the owner is away. Consequently the dog's

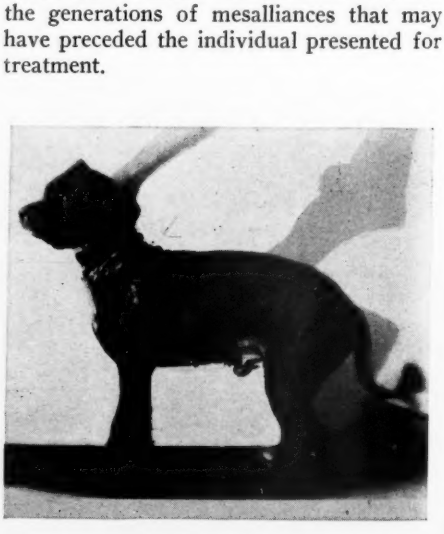


bladder is distended almost to the bursting point by the time it is allowed to go out. All of these factors are contributing causes in a large per cent of non-parasitic skin troubles.

Treatment.—No definite outline of treatment is offered in non-parasitic dermatitis, but rather each case must be treated individually. A thorough physical examination and correct diagnosis is more important than the formula applied to the skin. Each case is a definite entity, and treatment that proves of value in one case may fail in another. Laboratory diagnosis with intelligent evaluation of data will assist greatly in solving many of these cases.

Studies on several hundred cases of dermatitis by Dr. Morris indicate that nephritis, hepatitis, pancreatitis, blood and intestinal parasites, and chronic organic infections are frequently the cause when dogs fail to respond to the usual treatment.

Mild external applications will prove helpful in some cases to relieve itching, and internal medication is of value. The latter particularly to give the owner something to do. Intravenous medication has been followed by improvement in some cases and has failed miserably in others in my practice. Clipping will not only facilitate treatment, but allows air and sunlight to the skin, which is beneficial. Prevent the patient from scratching or otherwise infecting the skin if possible, and do not be too optimistic about the eventual outcome. Remember the generations of mesalliances that may have preceded the individual presented for treatment.



Surgical Notes

By E. A. EHMER,
Seattle, Washington.

The Author.

VETERINARIANS engaged in small animal practice exclusively are often accused of being inclined toward putting on a show, but if the truth were known, the castigation should be reversed and the other fellow should receive the criticism for his carelessness and haphazard methods, upon his occasional excursions into the small animal field.

To illustrate this, may we not consider some of the many cases in point. (1) A female, spayed in a neighboring small town comes in for stitch removal. This dog has a rent in her two inches long, heavy braided sutures with ends an inch long, red angry area surrounding the wound, and no bandage. The incision is oozing serum and pus, the stitches have cut partly through, and so little hair was removed at the time of operation that the hair now reaches the incision. (2) Another dog, a setter, injured while hunting near a country town and treated by the local veterinarian comes in in this condition: Long skin wound across the hip, little or no hair clipped off, nothing shaved, several large braided sutures inserted with the wound gaping between each two, hair and pus inside and outside the wound. (3) Another female, spayed by a college professor, comes in. She has the usual "hand size" incision, rope for sutures, wound full of straw and no bandage. At least no exclusive small animal practitioners put on such shows as those—and that's something.

In traveling a little and visiting numerous veterinary establishments, one runs into some unique though pitiful situations. Here is a man who pours a few drops of good old lysol in a pail or pan of water and thinks he's sterilizing his instruments by rinsing them in that. Another sterilized his instruments by boiling, then operated without a cover cloth and in so doing, fumbled around in the dog's hair with his hands and instruments.

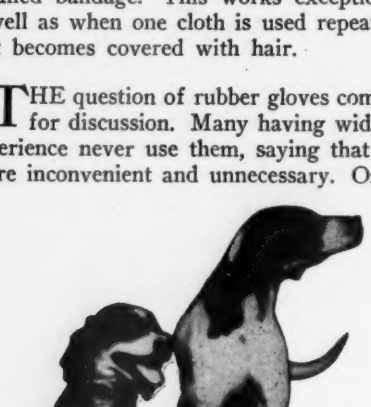
Some of this is due to ignorance, but some of it is deliberate and when it is mentioned the answer is, "the patients get along all right, so why bother."

ONE of the first steps in surgery is preparation of the surgical field. Be sure to clip and shave a large area. In doing an abdominal operation, shave an area six to ten inches in diameter. Also clip the surrounding long hair so that it does not reach the shaved area. This not only aids clean surgery, but it is very impressive to the owner—part of the show if you will, but it is good for the patient.

In any kind of surgery, especially in abdominal surgery, a cover cloth should be used. For this purpose, a 100-pound flour sack is ideal. This can be sterilized along with the instruments. This cloth, being a yard square will cover the entire patient and also the sides of the operating table. The operator thus has a place on which he may lay instruments and rest his hands. After the cover sheet is in place, a hole can be cut in it, through which the operator works. The edges of the cloth can be secured to the skin by towel clamps or what is more convenient, skin clamps. This insures against internal viscera slipping under the cloth and becoming foul from unsterilized areas. After this cloth is used once and washed out, it can be torn in two

pieces, each of which will make a many-tailed bandage. This works exceptionally well as when one cloth is used repeatedly, it becomes covered with hair.

THE question of rubber gloves comes in for discussion. Many having wide experience never use them, saying that they are inconvenient and unnecessary. On the



contrary, after a few trials, it is just as easy to work in gloves as without them. The added cost is very slight, and there can be no question but that a greater degree of asepsis is maintained when gloves are used. Everything that adds to the feeling of security, and work well done, is very much worth while, and the wearing of surgical rubber gloves when operating does just that, show or no show.

AT least a great many, if not the majority of tumors found in canine surgery are of the mammary type. These are, for the most part, somewhat pendulous and relatively free of muscle attachment. In removing such a growth it is well to lay aside the scalpel after the skin is incised and with a pair of heavy Mayo scissors bluntly dissect the tumor loose from the surrounding tissue. Scissors should have a very prominent place in all surgery.

After the removal of a very large mammary tumor, one often finds that there is a large cavity to be closed by a piece of skin. If the skin is merely sutured to skin on the opposite side of the cavity, there is a great hollow between. This skin may heal for a day or so, after which it turns black, sloughs off and finally contracts, leaving a gaping hole to heal by granulation. This can usually be avoided if while closing the wound in the first place, several sutures are passed down into the underlying muscle at different spots where the skin stands away from the tissues. These extra sutures cause a definite contact which is followed by the establishment of a blood supply between the skin and that which is beneath, thus closing a large wound in a few days that, otherwise, requires weeks.

What look to be tumorous growths in the groins of male dogs usually prove to be tumified testicles which have been forced from the scrotum at some former time and passed unnoticed. The moral of this is that one should be very careful to examine the scrotum of a dog that has been injured. Testicles which are forced from the scrotum can be readily replaced in most cases. Many stay in place without further attention. However, some do not. These, after being replaced, can be held there by applying a strip of adhesive tape around the scrotum between the testicle and the body.

Surgeons who operate on man are of the opinion that retained urine is a very damaging factor. Consequently immediately after a surgical operation the patient is catheterized. This is seldom considered in our work, notwithstanding it is very simple to empty the bladder in an anesthetized patient by moderate pressure on the abdomen. This is best done after anesthesia and before the operation begins.

HOW many veterinary hospitals have enough surgical equipment? Some boast of x-ray machines, etc., and when a simple abdominal operation is to be done, there aren't enough forceps available to do a decent tail dock. Any major operation calls for a dozen forceps and two dozen are nearer the right number. Forceps are not expensive and they last a long time if they are not allowed to lie around un-

cleaned and undried. Every man has his own notions about instruments. Some have all large and others all small forceps, but the real surgeon usually has a variety.

Not only is the quantity of instruments often lacking, but the quality may be bad also. How often have you had an old forcep slip off of a bleeding vessel because the lock was worn so that it would not hold. Scalpels are often so dull they wouldn't puncture an abscess. Knives with removable blades remedy this evil. Scissors get dull and loose at the hinge so that they are practically useless, yet they go on for months in the same condition.

THERE appears to be no plausible explanation for it, but it seems that most recent graduates presume that canine surgery calls for a small curved needle. The needle is often so short that it does not reach through the two sides of a spaying incision on a large dog. There is no excuse for this. A large needle, one that is at least three inches long is not too big for even a spaying operation on a cat, in fact is quite ideal for all abdominal wall closing. Not a single straight needle is to be found in many surgeries. Why not? A long straight needle is par excellence for such as suturing a torn ear or other skin suturing.

Silk worm gut and dermal suture are two threads which everyone should use on almost all external wounds. Silkworm gut is ideal for spaying as it sterilizes easily, has enough stiffness to tie readily, costs little and is just the right length for convenience. Dermal suture is finer and softer and being longer comes in handy for such as Cesarean operations where a larger wound is to be closed.

Intestinal surgery, while not engaged in so frequently, requires a special type of needle and thread. The needle must be of a non-cutting variety and the thread is usually catgut, size No. 0 or 00. Needless to say, if a needle with an eye is used the suture must be double when pulled through the tissue. This often causes tearing. A special needle and thread is manufactured in which the needle is "swedged" on to the thread. When this needle penetrates tissue the thread passes through the opening with no tearing since it is not doubled.

LARRY TRIMBLE, LOS ANGELES.
Mr. Trimble is one of the best known and most successful animal trainers in the motion picture industry.

THERE is no emergency case more important than a case of bite wounds. A few hours' lost time on some of these is the cause of fatalities. Every bite wound case demands very minute examination. Every tooth puncture should be checked as to its depth, degree of tearing beneath the skin, and as to what was pushed inside as the tooth entered. Some punctures appear too little to probe, but when opened up, one finds a veritable cave, which has been torn by the tooth, and hair and other foreign matter a plenty. These punctures must be opened wide, cleaned well and proper drainage provided. Do not be afraid to use the scalpel. Big wounds heal rapidly when clean, but small ones full of hair and infection never heal.

Dakins solution is certainly wonderful in the treatment of wounds. Used as a pack, in a syringe, or in an irrigator it is hard to equal. Plain sterile vaseline packed in certain clean wounds is fine. Antiseptic oils injected in the top opening where a seton is employed is a great asset. The annoying and painful eruption which appears at the bottom of a wound, caused by the drainage, can be avoided if vaseline or other ointment is applied there in the beginning.

Care and Treatment of Zoo Animals

By C. R. SCHROEDER
San Diego, California

ANY group of animals assembled and confined in a limited enclosure such as we call a Zoological Garden is actually a metropolitan district unto itself. Like a city, a zoo must maintain its own health department, whose duty it is to practice preventive medicine. Every branch of public health must have representation in the maintenance program of a zoo. Sanitation from an economic standpoint is of paramount importance. The care of zoo animals has far more importance than the treatment. When we speak of treatment we specifically refer to the administration of drugs to the ailing and the practice of surgery. Treatment so defined is like Roy Chapman Andrews interpretation of adventure. If his expedition is perfectly planned he experiences no adventure. The adventure follows a breach in preparation. If we were able to care for our exhibits perfectly, treatment would never become necessary.

Our experience leads us to believe that the specimen in captivity can be quite as content and unquestionably in better physical health than in his native habitat. In the zoo he is protected from his natural enemies, he receives a well-balanced ration throughout the year liberally supplied so that there is no necessity for spasmodic gorging. He is protected from the development of acute infestations of parasites. He is protected from exposure to infectious disease.

A BALANCED ration[1] for each exhibit is of primary importance. Vitamin intake must be liberal. Like dogs, carnivores in the zoo have a low C requirement, but must have a rich source of A, B, D, and G. Because of the questionable molecular structure of calcium and phosphorous compounds in bone, we prefer to feed bone as such in meal form rather than calcium diphosphate or related compounds. Cod liver oil and brewer's yeast are routinely fed, often indirectly. The mortality among snakes always increase, where the captive snake is fed vitamin deficient mice, rats and rabbits.

Apparently no food can stimulate an appetite quite as readily as yeast. We received a Baird's Tapir from Capt. Fred Lewis just returning from Panama, which refused all food but banana. We immediately instituted a cereal gruel diet fortified with five per cent brewer's yeast. After much persuasion she took a small feeding. Her second feeding required less coaxing. In four days, she greedily awaited her feeding hour. Her skin improved in texture, her body filled out and today she is in perfect condition.

Some difficulty was experienced in wintering our Galapagos tortoises. A 400-pound specimen lost weight rapidly and refused food. Tortoise metabolism is extremely slow. There was some indication of life, but actually our tortoise was dying. A heated enclosure and high nutritional enemas gave temporary stimulation. No marked change was evident until we administered brewer's yeast in a cactus paste per os via the stomach tube. The tortoise was a voluntary feeder one week after the primary yeast feeding and has remained so.

Our mountain gorillas developed a peculiar skin disturbance, grey, thickened, shedding epidermis with alopecia and sluggish appetite. The larger specimen N'gagi, demonstrated the least change, but failed to gain, the smaller N'gongo, lost weight and all his hair. Skin scrapings failed to reveal a causative agent. Fecal examination demonstrated a heavy nematode infestation[2] which failed to respond to a course

1 Standard rations for the tremendous species population of a zoo have not been determined. There is much room for improvement. Advantage is always taken of nutritional experiments conducted with poultry, dogs, and cattle.

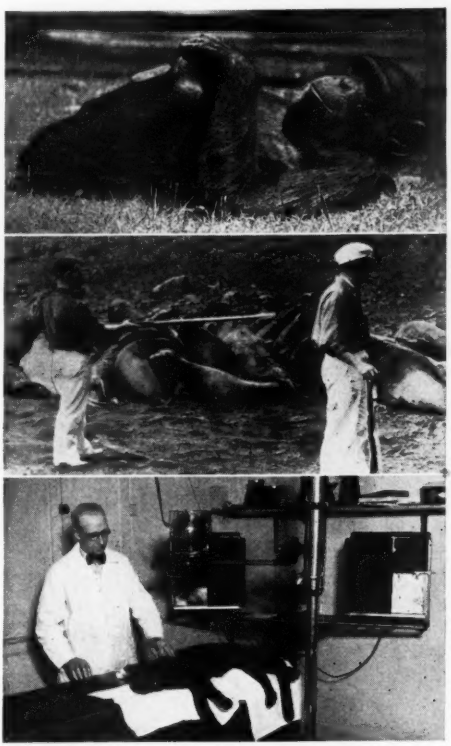
2 *Probstmyaria sp.*—"The life cycle of the parasite in question may take place entirely within the body of the host—," W. H. Wright, Acting in Charge, Anthelmintic investigations, Bureau of Animal Industry.

of santonin. Dr. Agnes Fay Morgan of the University of California, suggested that the gorillas might be suffering from vitamin B deficiency and that we increase the intake of vitamin B by giving more milk, egg, prunes and yeast. This was done and their rough thickened skin returned to its normal texture. Fortunately no permanent tissue change had occurred. An entire new coat of hair is making its appearance, the thighs, upper arms and backs of the hands have fleshed out. They are gaining weight and are again extremely active. Their parasitism still exists but the improved condition spontaneously reduced the extent of the nematode infestation to the point where we ignore it.

A avitaminosis has been experienced on our deer mesa. We fed alfalfa hay grown in the Imperial Valley area over a long period. This hay furnished an extremely poor source of vitamin A because of the high temperature and exposure to the direct rays of the sun during curing and storing. As a result we had a number of still births with gouty-like deposits on the viscera and kidneys in the new born. Vitamin A supplemental feeding has satisfactorily corrected this condition.

THE problem of supplying a balanced ration to sea mammals is quite perplexing. In San Diego we are fortunate in being able to obtain freshly caught fish at the packer's price on an annual contract. However, fish like poultry, does not have inspection. Numerous parasitic diseases of the seal are contracted through feeding fresh fish.[3] Bacterial and mycotic disease is not a rarity in fish in local waters. To assume a comparatively clean product, a great portion of the fish are cleaned to eliminate the possibility of the endogenous origin of organisms which might produce toxins in the meat (especially the dark meat fish with high hemoglobin content). If fish which have been without refrigeration for even a few hours in the warm months are fed, toxemias invariably result in the seal, penguin, and fish-eating birds. Deaths are frequent as a result. Cleaning fish, however, eliminates the source of essential food elements, the parenchymatous tissues.

The necessity of furnishing a balanced ration which would be stable and contain whole fish, vitamin and mineral reinforced, led to the preparation of what we term "sealogna". This consists of a mixture of whole fish meal, dehydrated kelp, cod liver oil (or other fish oils) and yeast enclosed in beef middles (animal casings). We find



Above: "Toto," a black faced Chimpanzee, that developed colitis during an outbreak of this ailment among residents of San Diego. Center: Counting elephant seal on Guadalupe Island, Baha, California. Many were suffering from ocular trauma, skin infections and parasitism. Below: Making an x-ray photograph of a black leopard under pentobarbital sodium hypnosis, in the x-ray laboratory in the Zoological Hospital, San Diego. On importation, this animal showed typical D avitaminosis.

3 *Anisakis* sp.; *Contracecum* sp.—"It is quite certain, I believe, that the cycle does not take place within the body of the seal since larval worms of this and closely related genera occur very commonly in fish—." E. W. Price, Parasitologist in charge, Miscellaneous Parasite Investigations, Bureau of Animal Industry.

that all fish eating exhibits can be taught to eat this preparation, but they will not take it voluntarily if it is thrown to them, they must be individually fed. We resort to this type of feeding in the event of a fish shortage, or questionable supply. Such a mixture will hold 60 per cent water before stuffing the casing which closely approximates the moisture content of fish.

Meat recovered from old horses in good flesh makes an excellent cat food, but carnivores will suffer from deficiency diseases if they must be maintained on a diet of cachexic horses which have themselves suffered avitaminosis.

DISINFECTION is a necessary part of zoo sanitation. Fortunately San Diego, a semiarid region, has an advantage climatically of low humidity and an abundance of sunshine. Balboa Park is built on a well-drained mesa sloping toward the sea. Chemical disinfection must be resorted to, however, for all pools and enclosures. We have found calcium hypochlorite (chlorinated lime) to be entirely satisfactory for use in any enclosure in a zoo. It is equally well tolerated by birds, mammals, and reptiles even in heavy concentration. It is an ideal physical cleanser as well as a bleach and deodorant. Because of its bulk it is economical. Men responsible for cleaning enclosures never become accustomed to using a more efficient concentrated product in smaller quantity. We have not experienced wasteful application of chlorinated lime, inasmuch as such an extravagance would require more labor than the keeper would voluntarily give. Coal tar products as a rule are not well tolerated by zoological exhibits. The small quantity of calcium chloride remaining from the expended chlorinated lime is not objectionable if taken internally on food. Coal tar products are especially objectionable from this standpoint.

Pools of standing water, accumulating growths on the walls and floor and supporting a rich growth of algae heavy with organic matter from the housed exhibit can be treated most economically with chlorinated lime without fear of an excess. The lime can be placed in a sack and pulled through the pool or spread over the surface with agitation. A moderately priced chlorine pH determinator[4] will give an immediate and quite accurate record of parts per million free chlorine in the pool so treated. 0.1 to 0.5 parts per million free chlorine is safe for the tenanted bird, seal or bear.

RODENT, fly, mosquito and snail control is a necessary adjunct to sanitation. Rats and ground squirrels are carriers of fleas, lice and mites to related exhibits and some not related, with of course the possibility of infectious disease carriage, tularemia and endemic plague. In an outdoor zoo where animals are placed in large enclosures on soil, rodents present a real problem. Spasmodic destruction must go on interminably. They continue to exist in numbers directly proportional to the available food.

Biting flies do much damage both as a constant source of irritation and indirectly as an excitant of infection in traumata and often are the direct cause of traumata owing to the animals' attempts to rid themselves of these dipterous pests. Flies will inhabit every accumulation of grass, hay, straw and manure and also seek out the open ditch. Electric fly screens are a real aid, but like the rodent, flies persist where food and breeding grounds are available. Slugs and snails in addition to flies and mosquitoes are always a source of parasites.

FOOD inspection is a routine procedure, to eliminate the horse or cow that has a transmissible disease; that is a cachexic before slaughter, or slaughtered improperly; and to prevent the feeding of improperly refrigerated meat, fish or their products; to prevent overfeeding or the use of pet remedies by keepers; to prevent the feeding of vegetables or fruits that are not fresh or which have fungicides and parasiticides adherent to them. We have had losses in monks following the long-continued feeding of lettuce and celery with adherent dusting and spray materials.

[4] We are using the La Motte, "Enslow" Chlorine Comparator, for determinations of 1.0-0.1 part free chlorine per million.

WE do not encourage the use of prophylactic or diagnostic biologics routinely, because the restraint necessary for proper administration does more harm than the advantage gained warrants.

THE first thought in construction of cages, grottos or other enclosures is to permit easy view of the exhibit for the visitor. However, we cannot overlook the comfort of the animal. We must eliminate draft, allow ample space for free movement and permit direct sun exposure. We must make a floor of nonporous, easily cleaned material and yet one that permits of quick movement by the animal, without slipping.

The health and habits of the keeper are directly reflected in the condition of his keep. In fact the zoo cannot be isolated from the community of which it is a part.

ISOLATION of the sick exhibit and quarantine of the exposed animal is rigidly enforced. Every incoming exhibit must go through a quarantine period not unlike the procedure followed in a United States Quarantine Station. If an animal incurs a nutritional deficiency, a wound, bacterial, mycotic, protozoal or parasitic disease after release from quarantine, it is usually because we have been neglectful. Treatment then becomes necessary.

CONDITIONS demanding medication in the zoo are ectoparasitism, dermal mycosis, gastro-intestinal disturbances of gross parasitic, bacterial, protozoal, or food origin, traumatism and on rare occasion respiratory disturbances. Traumatism with occasional fracture necessitates the bulk of surgical intervention.

Pyrethrum, rotenone and calcium polysulphide[5] dips or sprays have given most satisfactory results in our collection for ectoparasitism. We have used half strength tincture iodine or chlorine compounds[6] for treatment of external mycosis. These compounds are all tolerated in the proportions normally employed in all species. Coal tar products very decidedly are not tolerated.

The majority of vermifuges used are toxic. We do not routinely administer them but only resort to this type of medication when a fecal examination indicates the necessity of its use. Capsules are satisfactory only when it is possible to handle the exhibit or as in the seal where an extremely large capsule can be placed in fish and administered without crushing. A fast period is essential not only to lessen the dilution of the vermifuge in the intestinal canal but to increase the likelihood of the animal bolting small pieces of food in which his allotted dosage is contained. In any event some food acceptable to the animal must be used as the direct vehicle for the drug, which in part reduces its effectiveness. Santonin is still the accepted helminthicide because of the ease of administration and not because of its efficiency. Arecoline hydrobromide, however, is most satisfactory as a teniacide both because of ease of administration orally and its effectiveness.

THE probability of occurrence of transmissible disease in a zoological collection is rather remote unless it be latent tuberculosis. Tularemia, endemic plaque, psittacosis and various protozoal blood parasites are always possibilities but we have never identified them in this zoo. We

[5] Extracts of Pyrethrum and Derris root are used for flea and lice destruction on fur bearers and as a dip for snakes infested with mites.

[6] Half strength tincture of iodine has proved an efficient fungicide in dermal mycosis in monkeys (Epidermophyton). Various chlorine compounds have given equally satisfactory result in mycosis involving the plastron in tortoises.

have, however, experienced a *Proteus septicus* infection in Galapagos tortoises that resulted in a major loss and was very definitely transmissible. They responded in part to high colonic irrigations of either merthiolate or aqueous metaphen 1:10,000 with 10 per cent dextrose solution in massive doses per os. Organisms of the genus *Salmonella* are constant offenders in food poisoning.

Monks harbor a great variety of protozoa, usually *Sarcodina* (*Entameba coli*) and *Mastigophora* (*Flagellata, chilomastix*). We have never demonstrated any major change in the intestinal mucosa on autopsy of monks demonstrating amebiasis. Carbosone has been given in courses of 6gm. each to Japanese macaques without bringing about a negative stool. Presumably no local or systemic disturbance results from

Subject	*Time to complete anesthesia*	*Operation*
Black leopard (*Felis pardus*)	20 min.	X-ray Dorsal kyphosis
Spotted leopard (*Feli Pardus indicus*)	2 hrs. (probably subc.)	Amputation
Panama Deer (*Odocoileus chirisquensis*)	25 min.	X-ray Fractured pelvis
African sheep	Immediate	Udder amputation
Grey-cheeked mangabey (*Cercocebus albigena*)	4 min.	Tail amputation
Cherry-headed Mangabey (*Cercocebus torquatus*)	3½ min.	Contused wounds
Patas Guenon (*Ceropithecus patas*)	4 min.	Tail amputation
Patas Guenon (*Cercopithecus patas*)	5 min.	Removal of prolapsed rectum
Black spider monkey (*Ateles ater*)	4½ min.	Contused wounds
Moustache monkey (*Lasuiotga cephus*)	4 min.	Tail amputation
Weeper capuchin (*Cebus apella*)	3½ min.	Tooth extraction and sinus irrigation
Grizzly bear (*Ursus horribilis*)	2½ hrs. Partial, completed anesthesia with ether.	Bilateral cataract removal
Harbor Seal, male (*Phoca richardii*)	20 min.	Pelvic abscess.
California sea lion, bull (*Zalophus californianus*)	30 min.	Vocal cord removal
Grizzly Bear (*Ursus horribilis*)	16 min.	Removal of necrosed ear cartilage
Racoon (*Procyon lotor*)	12 min.	Sinus irrigation
Rats for pinealectomy		
Guinea pigs for cranial trephine		

* The weight of this animal was underestimated and insufficient dosage given, only a portion of it intraperitoneally. This case was described in a national news broadcast.

A polyvalent vaccine prepared from numerous organisms recovered from so-called "mouth rot' (necrotic stomatitis) in snakes injected intravenously in rabbits produced an immune sera that proved valuable in treating early lesions of mouth rot. The heterologous serum is injected subcutaneously over the thoracic wall of the snake. In fact, best results are obtained without mechanical removal of the accumulated exudate in the oral cavity, because pulling or tearing the buccal mucosa extends the lesion and reduces the likelihood of recovery.

Tuberculosis is not a major problem in San Diego. We have had tuberculosis in importations in deer, monkeys, and doves. the presence of these so-called nonpathogenic forms, though we would much prefer not having them inhabit our monks.

FOODS are the source of the greatest number of sick exhibits. Overfeeding, food allergy, spoiled foods, containing toxic substances, and deficient diets are the disturbing factors in the greatest number of sick exhbits. Catharsis is induced with phenolphthalein for the majority of animals that it is impossible to handle. Bears will take castor oil in almost any quantity. Fluid extract of aromatic cascara is accepted by some animals. Mineral oil has greatest use, however, in delaying absorption of toxic materials and physically aid-

ing in their elimination. A walrus experiencing cow's milk hypersensitivity had symptoms almost entirely relieved if mineral oil was administered with or just before milk feeding, by reducing the rate of absorption. Atonic constipation, the usual chronic state which exists in most captive orang-utans, is relieved by constant administration of oil.

Oral administration of cathartic drugs incorporated with bacteriostats given in conjunction with high oil or soap enemas usually alleviate the symptoms of food poisoning of bacterial origin. Symptoms of heavy metal poisoning are well recognized, but the specific element involved is often difficult to determine in which event we give large doses of sodium bicarbonate in addition to the foregoing treatment.

THE greater portion of our pneumonias are the result of metastasis, usually following gastro-intestinal disturbances. We have seen few primary pneumonias in San Diego in three years.

SURGERY usually necessitates the use of a general anesthetic. We routinely use barbituric acid derivative hypnotics unless we find a toxemia existing in our patient in which event we make an effort to delay operation until the toxic state is altered. We also use inhalent anesthetics in conjunction with morphine derivatives. The table on the preceding page shows a representative group of animals which have received pentobarbital sodium as a general anesthetic administered at the fixed rate of 29mgm. per kilo (1/5 gr. per pound), intraperitoneally.

THE practice of preventive medicine by the insistance upon a proper diet, avoidance of disease contacts, asepsis rather than antisepsis, comfortable housing with an abundance of clean water and sun exposure will reduce the necessity of treatment and is essential for the well-being of captive animals.

Book Review

Veterinary Military History of the United States, with a Brief Record of the Development of Veterinary Education, Practices, Organization and Legislation; in Two Volumes, by L. A. Merillat and D. M. Campbell. 1160 pages, profusely illustrated. Published by Veterinary Magazine Corp., Chicago, 1935. Price $10.00.

(Continued from last Month)

Volume II

The qualifying word, "Military," in the title of the History finds full justification in the second volume. The reader who is constitutionally or by reason of unfortunate conditioning "agin" any and all things military, may well read the first volume of the History, since it tells the complete story down to the World War period. Volume II (pp. 621 to 1160) consists of three books. Book VII deals with the service of the American Expeditionary Forces in France during the World War. Book VIII covers the period of 1920-1935 insofar as the Veterinary Corps of the army is concerned. Book IX gives lists of veterinarians who have served in the army of the United States. The names and service records of those who served in the Old Army (1866-1916); the names and the service records of all veterinary officers who served in the World War, and the names of all veterinary officers in the army at present, both in the Regular Army and in the Veterinary Reserve.

The second volume of the History is, perhaps, even better illustrated than the first volume. So far as a military ignoramus can judge, it is historically accurate, certainly well documented, impersonal, not studiedly sensational, complete, and well balanced. The non-military reader, whether professional or lay, cannot withhold from the authors full measure of praise for their profound scholarship.

There will be other histories of veterinary medicine, but it is safe to venture the guess that there will not appear a better

history of the American veterinarians' participation in the World War. The senior author is certainly as well qualified in all respects to chronicle—historically—these events for veterinary participation as was General Pershing for the general overseas participation or Secretary Baker for the *tout ensemble.* But no reviewer can do justice to a work that demands widespread perusal and study.

The most amazing reaction to this part of the History is the contrast between the American veterinary operations in Europe during the World War—and at home, too, in a lesser measure—and American civil veterinary routine, both private and governmental, at least since the beginning of the Twentieth Century. Picture a country that had produced such epochal scientific discoveries as were made by Texas fever and hog cholera veterinary investigators, such administrative achievements as almost universally have characterized the operation of the federal Bureau of Animal Industy and many of the analogous state bureaus, that had built up in about two decades a fairly creditable state-supported veterinary educational system (or lack of system, if you please!), and had filled its cities and country-side with a reasonably skillful profession of private veterinary practitioners; then take one good look at the mess called veterinary participation in the World War!

But, if the veterinarian blushes with shame, it must be emphatically stated and reiterated that it is not as a *veterinarian* that he needs to be shamefully angry, but as an American citizen. Shame should give place to sorrow, and sorrow to righteous indignation—and there the emotionally activated American is prone to stop. Indignation should, for patriotic and professional reasons—to say nothing of selfish and personal considerations—yield to intelligent action. So far as the veterinarian is concerned, his participation in military matters is ineluctable. Traditional American military blindness and political ineptitude must be overcome for the sake of America. If the History can only accomplish this it will well repay the authors for their otherwise thankless task.

The private practitioner in civil life is neither theoretically nor practically merely a garage man spending his days and nights in repairing mishandled animal machinery. He has wide interests in the realms of social, political, religious, business and professional pursuits. So in the confusion and turmoil of army life in the A. E. F. the veterinarian not only did his professional tasks, and did them well when he had anything to do with, but he did his best to act like an American human being. The American is a great organizer—maybe; but, in spite of all the efforts of the veterinarians, to the contrary, he didn't do a good job of organizing the Veterinary Corps, at least, until the war was nearly over.

The authors of the History have, fortunately, not given us a narrow, monotonous recital of army and war events, achievements and failures (mostly the latter), of exclusive veterinary interest. That would not be history. History must deal not only with events, phases, and group efforts; but it must also concern itself with causes, backgrounds, personalities, relationships and interrelationships, prejudices, traditions, in short with the thing as a whole. So the History in its treatment of this period, avoiding discursive forays into matters far afield, fits the veterinary activities into the picture and thus truly reconstructs a vivid painting that portrays what actually happened.

We get the general view, the obstacles met, the international reaction (devastatingly and effectively critical). Literally a Veterinary Corps was forced upon the A. E. F. by the French. It will be a disappointment if the classical historical critics fail to take cognizance of the History's treatment of the amazing working at cross purposes of the General Staff in France and the authorities at home so far as the Veterinary Corps is concerned. The Veterinary Corps (supposedly, at least by congressional action) was in the Medical Department at the beginning of the war. The

General Staff put it in the Quartermaster Department. Later it was put back where it belonged. And animals were neglected, died (mercifully but wastefully) by the thousands or were neglected (inhumanely and unnecessarily) by more thousands. The operations on the Marne, at St. Mihiel, and in the Meuse-Argonne offensive are vividly described—and unsparingly criticized.

It is hoped that war and foot-and-mouth disease will never again knock at America's door. If war does come it is hoped—but scarcely to be expected—that America will be ready, as far as the Veterinary Corps is concerned. *If foot-and-mouth disease comes we know that we will be ready.* It is to be hoped—but not expected—if we believe what we see in the papers, that America will never again go knocking at war's door. We know that we shall leave foreign animal plagues scrupulously alone to work out their own solutions in the land of the foreigner. Why these differences in hopes and expectations, in plans and applications? To quote:

> Many have wondered why General Pershing, far more skilled in statecraft than Jackson, Taylor or Grant, did not share the preferment accorded these generals. The prestige with the A. E. F. that misplaced officers of his own arm [cavalry] cost him may have been an important stumbling block in the pathway to the White House that every other commander in a major war has trodden.
>
> Veterinarians knew something about mange and glanders and influenza, paraphimosis, etc., and yet none of them were asked for advice or information; and when the Surgeon General, in a spirit of helpfulness, sent a capable emissary (Major Klein) over to make suggestions, he was permitted to return to Washington unheard.
>
> There were (early in 1918) then 60,000 American animals in France. A year had elapsed since war had been declared, and yet there were but 32 veterinary officers and 300 Veterinary Corps enlisted men to care for them.
>
> It is not good argument that other special services were no better developed.

The authors are impartial in their critical treatment of the subject. The cause of failures is not all laid on the doorsteps of the higher-ups. For example:

> The really comical thing about the World War veterinary service, as seen from the army, was the habit of the veterinary officers (not a single one of us knew much about war) calling each other names, instead of going into a huddle for our own and the army's salvation.
>
> No officer or soldier can for long cover up ignorance of his specialty with shiny boots, although knowledge plus shiny boots, makes the better combination.

Can you beat that for military philosophy!

> It was in such a Golgotha [the Meuse-Argonne offensive] that the veterinary service of the combat troops was developed in France. If this can succeed in impressing upon the minds of our own colleagues the simplest facts about the veterinary profession in the battlefield of the World War, its authors will feel well paid for their effort. . . .

Why not make the History required text or reference matter in our veterinary colleges? In the reviewer's school such courses as the history of chemistry, bacteriology, etc., are offered. Anyone who has listened to lectures of George Sarton of Harvard on the history of science and other subjects, even history, will appreciate the suggestion.

Reference has already been made to the contrast between American civil military efforts, and to foreign reactions to the latter. A quotation from the History is penetratingly pertinent:

> One may repeat that while it was generally known that the United States maintained an excellent veterinary service for its civil population, its army was notorious for the delinquency in that respect. Well-informed officers of the French Army frequently referred to the contrast between our civil and our military veterinary service.

It is feared that the layman is prone to condemn the army men for an apparent overemphasis on the matter of rank. Fortunately the History sheds light on this subject so far as the Veterinary Corps is concerned. To quote:

> But the fact remains that the training of the professional soldier breeds disdain for the advice of his inferiors. . . . There being technical reasons for this and no chance to change them, seeking higher rank is the professional man's most patriotic obligation if he hopes to give the army the benefit of his knowledge. . . .
>
> A veterinary corps was figuratively choked down the throat of the expedition by the Surgeon General in Washington, and its employment forced by the French.

Thanks to the History light is beginning to dawn on a dumb professor. The almost rabid antagonism of the veterinarians who

served in the World War, from lieutenant-colonel to veterinary student, is made clear.

In the Meuse-Argonne offensive, "The drain on horse power was extraordinary. The need of an orderly veterinary service was never greater in any military operation or in any war of history." But *the animal transportation was wrecked before the battle began.* All because of the traditional indifference of the U. S. Army to a well organized veterinary corps. Quoting again:

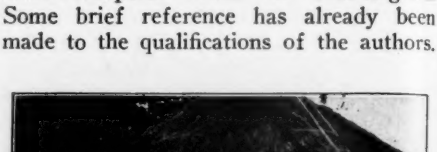
> At the noon hour of November 11, (1918) the groundwork for whispered criticisms and fairy tales about the Veterinary Corps in the Argonne had been laid, . . .
>
> Ours was a service thrown into action of extraordinary magnitude, not only unprepared for the task undertaken, but also without the guidance of competent regulations. . . .
>
> As these chapters are based upon the bare facts recorded in official reports, they contain irrefutable proof that the American veterinarians did well in that great conflict. . . .

The History is embellished with an exceptionally graphic account of the veterinary service with the field artillery of the A. E. F. written by Lt. W. H. Wright, who was with an active artillery regiment.

A chapter on hospitalization of animals in France describes the research laboratory in charge of Lt. A. A. Leibold and the exceedingly creditable work of Lt. Col. Reuben Hilty in training the personnel of a veterinary hospital and in the construction of the hospital itself. But it is folly to attempt the recital of the achievements of all the men whose stories are treated in the History.

The war ended. Among the post-armistice activities and events should be mentioned the greatly improved condition of the Veterinary Corps and the horses, the horse shows,—all of which brought commendation from General Pershing and Commanding Generals of divisions. And finally there was "The School of Veterinary Medicine of the A. E. F. University," with Major George B. McKillip in charge. The Chief Veterinarian of the First Army wrote Dr. John R. Mohler warning against the dangers of introduction of equine diseases into the United States, and retired from active army service.

The History will be read, studied, criticized, and it is hoped reviewed by many more competent than the undersigned. Some brief reference has already been made to the qualifications of the authors.



However, an *opus magnum* such as the History is not casual and its creators are not just two veterinarians. The work is no greater than the workers; therefore, a brief statement of the combined experience of Merillat and Campbell must serve to bring this reviewer's review to a close:

More than 75 years of more than average activity in the veterinary profession; student experience at the two largest veterinary schools on the continent; a teaching experience in four veterinary schools; a large-animal, city practice; a small-animal, city practice; rural practice in the north and in the south; experience in municipal inspection, in the Bureau of Animal Industry and in the army; experience with two large commercial firms; an extraordinary experience in veterinary publication, and attendance at more than a thousand veterinary meetings; with participation in veterinary organizations which includes the presidency of the A. V. M. A., of the Missouri Valley Veterinary Association, the Illinois State Veterinary Medical Association and the Chicago Veterinary Society; secretary of the A. V. M. A., of the Illinois S. V. M. A., the Chicago V. S., and the United States Live Stock Sanitary Association; and contributions to the programs of some hundreds of veterinary meetings.

WARD GILTNER.

East Lansing, Mich.

ARMY VETERINARY SERVICE

The promotion of each of the following-named officers in the Veterinary Corps with rank from August 1, 1935, is announced.

First lieutenants to be captains: Arvo Theodore Thompson, Harvie Russell Ellis, Ralph William Mohri, Austin Taylor Getz, Wesley Watson Bertz, Edgerton Lynn Watson, George Townley Price, Russell McNellis (Aug. 3) and Richard G. Yule (Aug. 18).

Second lieutenants to be first lieutenants: Richard George Yule, Wayne Otho Kester, Robert Arthur Boyce, Jr., Clarence Leonard Taylor, William Edwin Jennings, Curtis William Betzold, James Bernhard Nichols, Albert Arthur Roby, Jr., Andrew Jesse Sirilo, Daniel Stevens Stevenson, Ray Swartley Hunsberger, and William Frances Collins.

Captain Ralph W. Mohri is relieved from duty at Fort Riley, Kans., effective in time to proceed to New York, N. Y., and sail on or about December 31, 1935, for the Philippine Department, for duty.

Captain Arvo T. Thompson is assigned to duty at Fort Riley, Kans., upon completion of his tour of foreign service in the Philippine Department.

Lt. Col. Jesse D. Derrick is relieved from further assignment and duty at Ft. Des Moines, Iowa, will proceed to Omaha, Nebr., and report to the commanding general, Seventh Corps area, for duty at his headquarters and additional duty as attending veterinarian at Fort Omaha, Nebr., and Fort Crook, Nebr.

Major John W. Miner is relieved from duty at Fort Riley, Kans., will proceed to Fort Douglas, Utah, and report to the officer in charge, purchasing and breeding headquarters, for duty and is assigned to additional duty as attending veterinarian at Fort Douglas and at the University of Utah.

Major Claude F. Cox is relieved from duty with the purchasing and breeding headquarters, Fort Douglas, Utah, and from additional duty as attending veterinarian at Fort Douglas and at the University of Utah, will proceed to Fort Des Moines, Iowa, and report to the commanding officer for duty.

Appointments in the Veterinary Corps of the Regular Army

As a result of a recent examination the following candidates were found qualified for appointment as first lieutenants in the Veterinary Corps of the Regular Army:

McGinnis, Velmar W., Ord, Nebraska.

Rust, John H., III, 23 Forest Street, Wellesley Hills, Mass.

Trum, Bernard F., 61 Washington Street, Natick, Mass.

Tekse, Lloyd C., Glencoe, Minn.

Cady, Duane L., Arlington, Nebr.

Millenbruck, Edwin L., Herkimer, Kans.

Jones, Thomas C., 1219 Warren Street, Boise, Idaho.

Carll, Walter T., 65 Nicholas Street, Bridgeton, N. J.

(*Continued on page IX*)

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Kelley, Donald C., 1121 Washington St., Great Bend, Kans.

There are at present seven vacancies in the Veterinary Corps. Appointments to fill these vacancies will be tendered the first seven on the above list. The remaining two will be considered for subsequent vacancies.

Veterinary Reserve Corps

Promotions:

Coyner, David Floyd, To: Major, 164 Yosemite Av., Fresno, Calif.

McCreary, Virgil Dudley, 1st Lt., P. O. Box 405, Brewton, Ala.

New Acceptances in the Grade of First Lieutenant:

Allen, Bertram Verlou, 914 Harmer St., Fort Wayne, Ind.

(*Continued on page XI*)

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**The Veterinary Record, Dec. 8, 1934, Vol. 14, No. 49.*

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Hasson, David Samuel, 210 E. 5th St., Mulberry, Kans.

Leach, Benjamin Francis, East Fairfield, Vt.

Leenerts, Theodore Henry, Box 2522, Reno, Nevada.

Milks, Clifford Howard, Newark Valley, N. Y.

Mouw, John Englen Bertus, Edgerton, Minn.

Prchal, Charles Frank, 4112 S. 12th St., Omaha, Nebr.

Werrin, Nathaniel, 1104 N. 41st St., Philadelphia, Pa.

Badger, Jos. Edward, North Hackensack, N. J.

Bean, Clyde Wm., Route 1, No. 77, Littleton, Colo.

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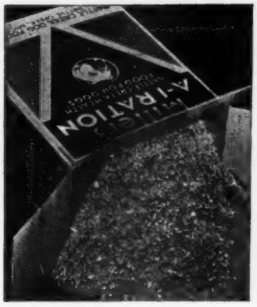

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The cost of fresh meat is a vital concern of every doctor today. By using Kibbles you can keep feeding costs within reason. Ask your jobber or send for FREE SAMPLES and dealers' price list today. We do not make or sell dog medicines.

GOOD ONLY EAST OF ROCKIES

Battle Creek Dog Food Co.
1133 State St., Battle Creek, Mich.

As offered in Veterinary Medicine kindly send me free professional samples of Miller's Bio-Tested Kibbles and dealers' price list.

Doctor.....

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City and State.....

For Small Animals

Use *Norden Certified*

Bismuth-Pepsin Compound

Thick and Creamy. Pink color. Possesses valuable anti-fermentative and carminative properties. Gastric sedative and anti-diarrheal agent. Contains Milk of Bismuth, Pepsin, Salol, Zinc Sulphocarbolate, and essence of anise in well balanced formula.

Pint 75c. Gal. $4.50

Use *Norden Certified*

Tetramagnelene Capsules

A two in one vermifuge! Contains Tetrachlorethylene C. P. to destroy roundworms, hookworms and stomach worms; plus Magnesium Sulphate for saline purgative action and to prevent absorption.

No. 1. (1-2 c.c.).....100, $1.25
No. 2. (2 1-2 c.c.)..Doz., 45c; 50, $1.25

Use *Norden Certified*

MALGREEN

"Irish Iodine"

Powerful skin disinfectant, containing bactericidal dye, malachite green. For use in surgery and skin infections and vaccinating. Non-irritating, non-corrosive.

Doz. 1-2 oz. bottles with glass applicators $0.90
Doz. 4 oz. bottles with dauber stoppers $2.75
Pint.....$0.60. Gallon.....$2.50

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"The Mark of Quality"

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A Serious Animal Disease

Purulent Catarrh of the Endometrium is as serious as it is frequent. Here the internal administration of **FISTONE** is a near specific, being used and acknowledged by leading veterinarians and hospitals the world over in all localized suppurative infections in veterinary practice.

The Fistone and Appliance Company,
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Enclosed please find check for $8.00, for which send me one dozen 12 ounce boxes of FISTONE (Trial Order) ONCE only. Regular price $10.00. One-half dozen boxes $5.00.

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Johnson, Harry Wm., 206 Wood St., Urbana, Ill.

Kenaston, Glenn Harry, 5417 N.E. 33rd Ave., Portland, Ore.

Koch, Bernard, 141 Hawthorne Ave., Newark, N. J.

Kramer, Wm. Newton, R.R. No. 2, Davids Church Road, Dayton, Ohio.

Linzinmeir, Charles Bertram, Marysville, Ohio.

Live, Israel, 3918 Pine St., Phila., Pa.

McGee, Lucius Elijah, 334 Federal Bldg., Okla. City, Okla.

Milliken, John Charles, 1141 S. Emerson, Denver, Colo.

Peters, Max Robison, Redkey, Ind.

Sundberg, Carlton Eugene, Linn Grove, Iowa.

Tuttle, Martin Lyon, 2788 Indianola Ave., Columbus, Ohio.

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Veterinary Reserve Officers on Active Duty
New Appointments:

(*Continued on page XIV*)

THIS SYMBOL CAN WORK FOR YOUR PROFIT

It can help to bring you in contact with more of the type of dog owners and breeders who seek professional service in the management of their animals.

It can produce an extra source of income directly, on its own account.

It stands for the dog food which is rapidly gaining in demand because its nutritive value is *proving* its superiority to veterinarians everywhere.

Formulated on a genuinely scientific rather than commercial basis, it is the result of several years of biological research under direction of Dr. John W. Patton. Many veterinarians have found it worthy of their professional endorsement and useful to them in their professional services.

This food is not extensively distributed through retail stores. It has not been "promoted" to compete on a straight commercial basis. The veterinarian who has it for sale is in a position to attract the patronage of the well-informed dog owners who are seeking Gaines Food in increasing numbers.

Write for agency proposal.

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For Sale, Wanted, etc., $2.00 for 25 words or less; additional words, 8 cents. 25 cents extra when replies are sent in care of VETERINARY MEDICINE.

DOG WORLD, monthly magazine, all breeds, all dog subjects, $2.00 per year, $3.00 two years. Can furnish any dog book published. Judy Publishing Company, Judy Bldg., 3323 Michigan Blvd., Chicago.

FOR SALE: By a veterinarian retiring on account of advanced age, a long established practice in a rich agricultural section. Address No. 133, care of VETERINARY MEDICINE.

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Lt. Richard E. Geisler, Pres. of Monterey, Calif.
Maj. Jay G. Townsend, Vancouver Bks., Wash.
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Capt. Guy Castleberry, Pres. of San Francisco Calif.

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ACCEPTED AND USED BY THE PROFESSION SINCE 1900

In the treatment of Splints, Spavins, Sidebones, Curbs, Inflamed Tendons, Bursal Lameness, etc.

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SINGLE BOTTLE	$ 2.00
¼ DOZEN 1 BOTTLE FREE	5.00
½ DOZEN 2 BOTTLES FREE	8.00
1 DOZEN 4 BOTTLES FREE	15.00
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OUTWARD applications of Antiphlogistine to the chest area are held to be most effective in the treatment of bronchitis.

It is the choice of leading veterinarians for the treatment of respiratory affections of the veterinary patient.

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Send for sample and literature

The Denver Chemical Mfg. Co.
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Please send me sample and literature.

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• CATTLE •

CARBOZOO
(A New Anthrax Vaccine)

Carbozoo is recommended for immunization of cattle, horses, sheep, goats, and other animals against anthrax infection.

Carbozoo is not recommended for animals affected with anthrax. In such cases, anti-anthrax serum should be administered.

Dosage: ⅛ cc. for sheep, goats, and young calves under six months; ¼ cc. for horses and cattle. One dose is sufficient for definite protection.

Packages: 5 cc. vials (20 large or 40 small animals); 10 cc. vials (40 large or 80 small animals).

The older simultaneous and spore vaccines are available.

ANTI-ANTHRAX SERUM (Curative)

Dose: From 30 to 100 cc. Continue at 6-hour intervals until there is a drop in temperature.

Packages: 100 and 500 cc. vial, of equine or bovine origin.

ABORTION TEST ANTIGEN

For the rapid agglutination test.

Package: 20 cc. vial (200 tests). Illuminating boxes are also available.

BLACKLEG AGGRESSIN

Dose: 5 cc.

Packages: 25, 50, 100 and 250 cc. vials.

BLACKLEG VACCINE
(Whole Culture)

Packages: 25, 50, 100 and 250 cc.

ANTI-BLACKLEG SERUM (Curative)

Dose: 30 to 100 cc. intravenously or subcutaneously.

Package: 100 cc. vial.

HEMORRHAGIC SEPTICEMIA AGGRESSIN

Dose: 5 cc. for horses and cattle, 2½ cc. for sheep, goats and swine, ½ cc. for fowl.

Packages: 25, 50, 100 and 250 cc. vials.

HEMORRHAGIC SEPTICEMIA VACCINE (Whole Culture)

A chemically killed undiluted whole culture.

Dosage: 5 cc. for cattle and horses; 3 to 5 cc. for swine and sheep; 1 cc. for fowl.

Packages: 50 and 250 cc. vials.

ANTI-HEMORRHAGIC SEPTICEMIA SERUM

For prophylaxis: Cattle and horses, dose 15 cc.; swine, sheep and goats, dose 10 cc.; fowl, dose 2½ cc.

For treatment: 50 to 100 cc. Repeat in 12 to 24 hours.

Packages: 100 and 500 cc. vials.

MASTITIS MIXED VACCINE
(Bovine) (Whole Culture)

For infectious Mastitis and Garget in cattle.

Dose: 5 cc. per animal.

Packages: 50 and 250 cc. vials.

MIXED BACTERIAL VACCINE
(Bovine) (Whole Culture)

For Infectious Metritis and retained placenta.

Treatment: 5 cc. per animal and repeat in 3 days.

Prophylaxis: 5 cc. for each animal on the premises. Repeat in 7 to 14 days.

Package: 50 cc. vial.

WHITE SCOURS VACCINE
(Whole Culture)

Dose: 5 cc. per animal.

Package: 50 cc. vial.

WHITE SCOURS ANTI-SERUM

For White Scours in calves and navel-ill in foals.

Dose: Prevention, 10 cc.; treatment, 30 cc. or more as required. Repeat as frequently as needed.

Packages: 10, 30 and 100 cc. vials.

• HORSES •

EQUINE INFLUENZA VACCINE
(Whole Culture)

A single 5 cc. dose gives a mild protection. Three doses give a more lasting protection.

Packages: 50 and 250 cc. vials.

EQUINE ANTI-INFLUENZA SERUM

For *prophylaxis* use 50 cc.; for *treatment* use 50 to 100 cc., and repeat in 12 to 24 hours if necessary.

Package: 50 cc. vial.

ANTI-EQUINE ENCEPHALOMYELITIS SERUM (Polyvalent)

Dosage: For *prophylaxis*—50 to 100 cc. For *treatment*—100 to 200 cc., preferably intravenously. Repeat in 8 to 12 hours.

Packages: 100 and 250 cc. vials.

MALLEIN (Subcutaneous)
(Intra-Palpebral) (Ophthalmic)

For the diagnosis of Glanders in horses.

MIXED BACTERIAL VACCINE
(Equine) (Whole Culture)

For mixed infections in horses.

Dose: 5 cc. per animal.

Package: 50 cc. vial.

TETANUS ANTITOXIN

For *immunization*, 1500 units. For *treatment*, from 10,000 to 100,000 units.

Packages: 1500 and 5000 units in syringes or vials; 10,000 and 20,000 units in vials.

TETANUS TOXOID
(With Alum Precipitate)

For lasting protection against tetanus.

Packages: 1 dose (10 cc.); 5 doses (50 cc.).

• HOGS •

ANTI-HOG CHOLERA SERUM (Clear)

When employed on susceptible hogs with the proper dosage of Hog Cholera Virus it establishes immunity.

Dosage: According to directions on package.

Packages: 100, 250 and 500 cc.

HOG CHOLERA VIRUS

Active virus to be used with serum in immunising hogs.

Packages: 10, 20 and 50 cc. vials.

MIXED BACTERIAL VACCINE
(Swine) (Whole Culture)

For mixed infections in swine.

Dose: 5 cc. per animal.

Packages: 50 cc. and 250 cc. vial.

SWINE ERYSIPELAS SERUM

Effective in preventing losses from Swine Erysipelas.

Dose: 10 to 40 cc., according to weight.

Packages: 50, 100, 250 and 500 cc. vials.

• SMALL ANIMALS •

CANINE DISTEMPER VACCINE
Laidlaw-Dunkin Method

For immunizing dogs against Distemper. (One or two doses of 5 cc.).

When two doses of vaccine are employed, the interval between doses is from 10 to 15 days. To ensure life immunity virus should be given intradermally 14 to 21 days after the administration of vaccine

Packages: 1—5 cc. syringe and 2—5 cc. syringes.

CANINE DISTEMPER VIRUS
Laidlaw-Dunkin Method

For completing the immunization against Canine Distemper. Use only after vaccine (from 14 to 21 days).

Package: 1 dose (10 mg. virus in syringe with diluent).

ANTI-CANINE DISTEMPER SERUM

Prepared by hyperimmunizing dogs with Canine Distemper Virus (Laidlaw-Dunkin), and organisms associated with the complications of distemper.

For Passive Immunity (10 to 20 days): Use 10–20 cc.

For treatment: 2 cc. per pound of body weight. Repeat in from 6–12 hours till symptoms are controlled.

Packages: 10, 30, 50 and 100 cc. vials.

ANTI-CANINE MIXED INFECTION SERUM

For the various mixed infections in dogs and the secondary infections following distemper.

Do not confuse with Anti-Canine Distemper Serum.

Package: 50 cc. vial.

CANINE RABIES VACCINE
(One Injection Method)

Immunizes for approximately one year. Repeat annually.

Both phenol- and chloroform-killed vaccine available.

Dose: 3 to 5 cc.

Good results are obtained in the treatment of exposed animals by the injection of 6—5 cc. doses of this vaccine at daily intervals.

Packages: 5 cc. vial, 6—5 cc. vials, 50 cc. vial (10 doses).

RABIES VACCINE—6 Dose
(Dilution Method of Hogyes)

For the treatment of animals exposed to rabies. Six doses of this special, living, fixed virus in varying dilutions are given over a 6-day period.

Package: 6 vials. When ordering, specify animal to be treated.

STAPHYLOCOCCUS TOXOID

For treating staphylococcic infections such as Pustular Acne, secondary skin infections of mange and persistent abscesses and carbuncles.

Dosage should be graduated: Small animals—0.5 to 2 cc.; large animals — 1.0 to 5 cc.

Package: 10 cc vial.

FELINE MIXED VACCINE
(Killed Organisms)

For the prevention and treatment of distemper and infectious enteritis complications in cats.

Package: 5 cc. vial.

MIXED BACTERIAL VACCINE
(Canine)

For the treatment of mixed infections in dogs and the complications of distemper.

Dosage: 2 cc.

Package: 20 cc. vial.

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LEDERLE LABORATORIES, INC., NEW YORK

MOBILIZING the DEFENSIVE FORCES

in the treatment of

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IN VARIOUS infections the general defensive forces of the body are markedly stimulated by the intramuscular injection of nonspecific proteins reinforced by lipoids.

A combination of these immunizing agents is represented in

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Shockless Lipo-Protein Therapy

Supplied in 2 cc. ampules, boxes of 5 and 100. Informative literature and prices on request.

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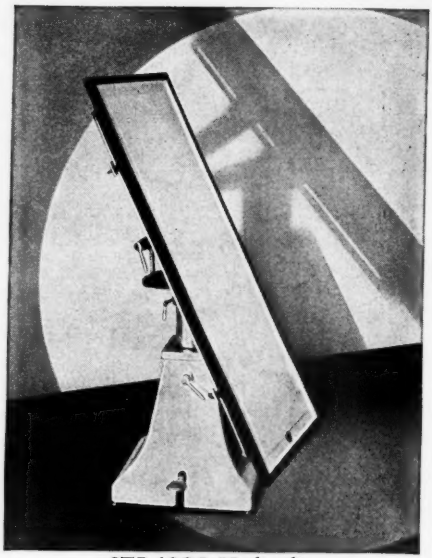

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SMALL ANIMAL TABLE

Priced at ***$79.50***

R. J. STRASENBURGH CO., ROCHESTER, N. Y.

Manufacturers of TONAMINE

SUCCESSFUL VIRGINIA MEETING

The forty-second annual meeting of the Virginia State Veterinary Medical Association was held at Richmond, Virginia July 10-11-12, 1935. The Virginia Association was host to the Associations of Maryland, West Virginia, North Carolina, South Carolina and the veterinarians of the District of Columbia. Over four hundred were registered for the three-day session.

The annual meeting of the Southern States Veterinary Medical Association will be held at the Piedmont Hotel, Atlanta, Georgia, November 7-8, 1935. For information regarding the program, address the secretary, Dr. M. R. Blackstock, Spartanburg, South Carolina.

The annual meeting of the West Virginia Veterinary Medical Association will be held at Charleston, October 29-30, 1935. S. E. Hershey, Charleston, secretary of the association, will furnish full information relative to the program.

EXAMINATION FOR NEBRASKA LICENSE

The Bureau of Examining Boards announces that the next examination for licenses to practice veterinary medicine in the state of Nebraska will be given November 4-5, 1935, at the State House, Lincoln. Applications should be on file at least fifteen days prior to the date of examination.